Just for your TANDY COLOR COMPUTER

June 1986

Canada $4.95 U.S. $3.95

The RAINBOW®

THE COLOR COMPUTER MONTHLY MAGAZINE

Electronic Euphony

Listen!

Use your CoCo as a synthesizer
Add exciting sound effects for programs

Compose!

CoCo Instant Music with PLAY strings
Print your own sheet music paper

Entertain!

Experience CoCoTV
Play 'Name that Tune'

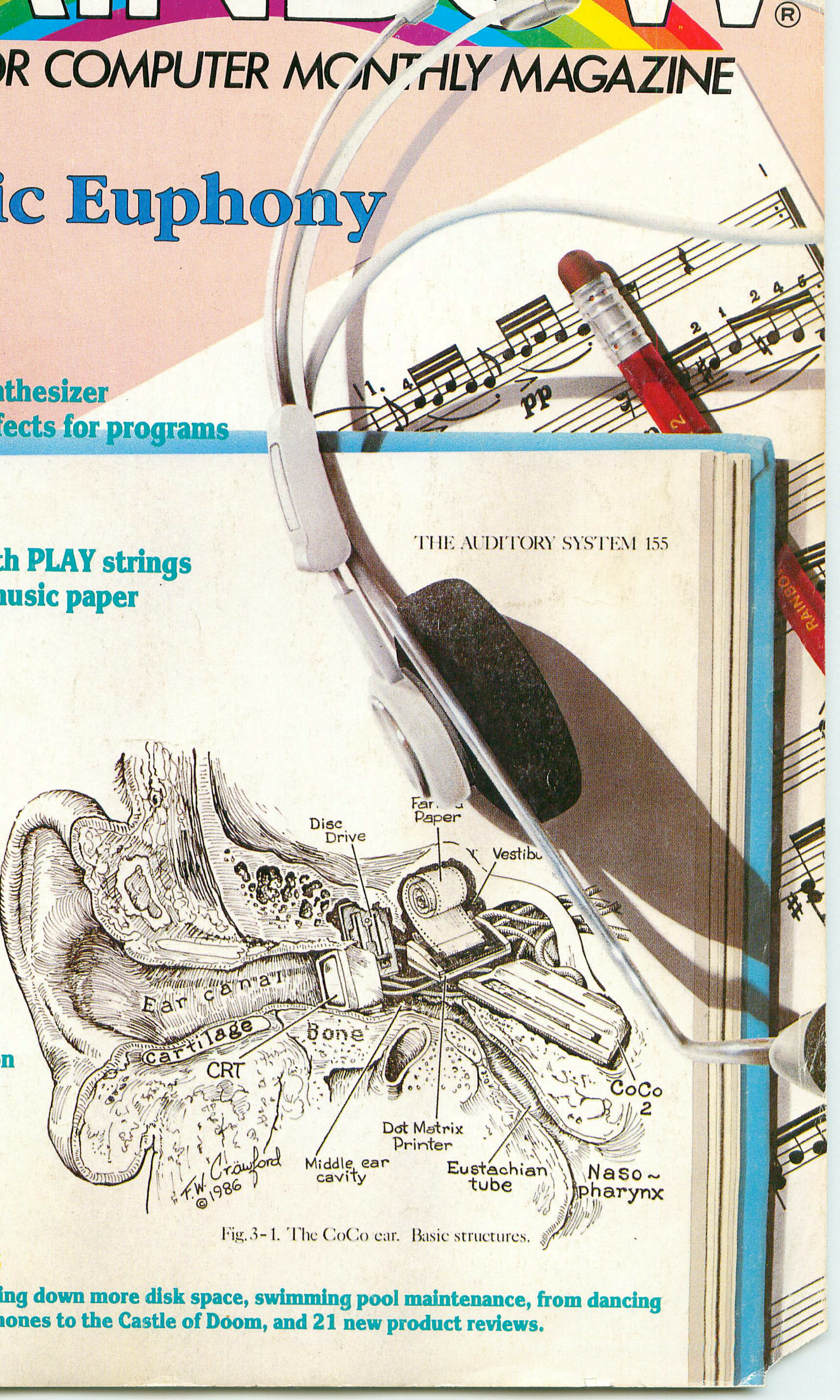

THE AUDITORY SYSTEM 155
pp
RAINBOW
Far d Paper
Disc Drive
Vestibu
Ear canal
Cartilage
Bone
CRT
CoCo 2
Dot Matrix Printer
Middle ear cavity
Eustachian tube
Naso~pharynx
F.W. Crawford ©1986

Fig. 3-1. The CoCo ear. Basic structures.

And Marty!

MS-DOS to CoCo Conversion
EPROM Erasure Technique
Delphi Database Report

Plus

Tracking down more disk space, swimming pool maintenance, from dancing telephones to the Castle of Doom, and 21 new product reviews.

The Best Money Can Buy . . .
HDS Floppy Drive Controller Board

HARD DRIVE SPECIALIST
COLOR COMPUTER CONTROLLER
REFER TO OWNERS MANUAL BEFORE OPENING
HARD DRIVE SPECIALIST
COLOR COMPUTER CONTROLLER
HDS

Features
- Gold Plated Edge Cards
- Dual Selectable ROM Sockets
- Compatible with COCO I & II
- 120 Day Warranty
- Double and Single Density

	DOUBLE SIDED
Drive 0 Complete	$199.
Drive 1 Complete	$129.
Drive 0 & 1 Dual Drive	$319.

Reduce your I/O errors with the Hard Drive Specialist Floppy Drive Controller for the Color Computer. Gold edge card connectors, advanced design, and the absence of potentiometers make it the best available. Our newest version controller allows the use of either (two 24 pin ROMS), or (one 24 pin and one 28 pin ROM). Using this board with the standard Radio Shack ROM gives you 100% compatibility with all Radio Shack software.

Completed and Tested Board with Radio Shack ROM . . . . $99.
(Includes Case, and DOS Instructions)

Completed and Tested Board without ROM . . . $79.
(Includes Case)

Bare Board with Instruction manual . . . . $30.

Parts Kit For Bare Board without ROM . . . . $30.

Radio Shack ROM (current version) . . . . $20.

Radio Shack ROM 1.0 . . . . $40.

ADOS ROM (24 or 28 pin PROM) . . . . $40.

ADOS is a product of SpectroSystems of Miami Florida and is fully supported by the author. The HDS version of ADOS supports 2 drives, 40 track, 6ms trk-to-trk drives only, either Single Sided or Double Sided.

TKBUG Monitor and DOS 1.0 on PROM (24 or 28) . . . . $40.

New, unique CoCo software monitor in ROM designed for a minimum of key strokes and fully compatible with the 1.0 version of disk basic. Features 33 single key commands, allowing the user to quickly display and screen edit RAM in either hex or ASCII format. Also allows the user to dump screen or memory to printer, set break points, alter baud rate, set 64K RAM mode, and more, TKBUG by TOMMY KEETON.

HARD DRIVE SPECIALIST

Ordering Information:

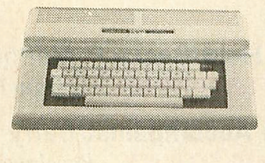
Use our WATS line to place your order via Visa, MasterCard, or Wire Transfer. Or mail your payment directly to us. Any non-certified funds will be held until proper clearance is made. COD orders are accepted as well as purchase orders from government agencies. Most items are shipped off the shelf with the exception of hard drive products that are custom built. UPS ground is our standard means of shipping unless otherwise specified. Shipping costs are available upon request.

1-713-480-6000
Order Line 1-800-231-6671
16208 Hickory Knoll
Houston, Texas 77059

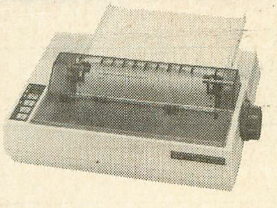
From Computer Plus to YOU . . .

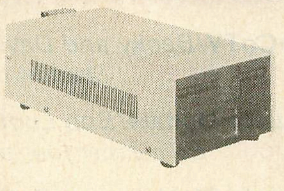
PLUS after PLUS after PLUS

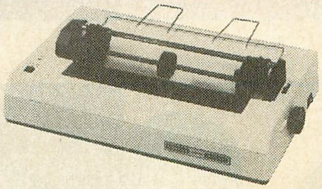
Tandy 200 24K $649
Tandy 600 32K $1269
Model 100 24K $425


Color Computer II
w/64K Ext. Basic $165

Tandy 1000 $685
Tandy 1000HD $1539
Tandy 1200HD $1599


DMP-130 $269


Color Computer Disk Drive
Drive 0 $239 Drive 1 $189


DMP-105 $160

BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

COMPUTERS	
Tandy 1000 1 Drive 128K	685.00
Tandy 1000 HD 10 Meg. 256K	1539.00
Tandy 3000 1 Drive 512K	1969.00
Model IVD 64K with Deskmate	889.00
PRINTERS	
Radio Shack DMP-105	160.00
Radio Shack DMP-130	269.00
Radio Shack DMP-430	660.00
Radio Shack DWP-220 Daisy Wheel	469.00
Silver Reed EXP-500P Daisy Wheel	229.00
Star SG-10	245.00
Star SG-15	410.00
Panasonic P-1091	259.00
Panasonic P-1092	339.00
Toshiba 1340	439.00
Okidata 192	375.00
Epson LX-80	245.00
Epson FX-85	369.00
MODEMS	
Radio Shack DCM-3 Modem	52.00
Radio Shack DCM-5 Modem	99.00
Radio Shack DC Modem Pac	79.00
Radio Shack DC Modem 2212	315.00

COLOR COMPUTER MISC.	
Radio Shack Drive Controller	139.00
Extended Basic Rom Kit	39.95
64K Ram Upgrade Kit	39.00
Radio Shack Deluxe Keyboard Kit	24.95
HJL Keyboard Upgrade Kit	79.95
COCO Max Y Cable	27.95
Color Computer Mouse	44.00
Multi Pack Interface	89.00
Botek Serial to Parallel Conv.	69.95
Radio Shack CCR-81 Recorder	52.00
Radio Shack Deluxe Joystick	26.95
Amdek Color 300 Monitor	265.00
Amdek Video 300 Green Monitor	139.00
Amdek Video 300 Amber Monitor	149.00
Goldstar Amber Monitor	99.00
Radio Shack VM-2 Green Monitor	129.00
Mark Data Universal Video Driver	29.95

COLOR COMPUTER SOFTWARE	TAPE	DISK
Approach Control Simul.	29.95	34.95
Worlds Of Flight	29.95	32.95
Mustang P-51 Flight Simul.	29.95	34.95
Spectral Typing Tutor	19.95	22.95
Dungeon Quest	24.95	27.95
Major Istar	24.95	27.95
Sam Slueth Private Eye	24.95	27.95
Mark Data Graphic Adven.	24.95	27.95
COCO Util by Mark Data		29.95
COCO Max by Colorware	69.95	
COCO Max II by Colorware		79.95
AutoTerm by PXE Computing	39.95	49.95
TelePatch by Spectrum		19.95
TeleWriter 64	49.95	59.95
Deft Pascal Workbench		89.95
Deft Extra		39.95
Pro Color File Enhanced 2.0		59.95
Max Edit by Derringer		19.95
Elite Calc	69.95	69.95
Elite Word	69.95	69.95
Elite File (disk only)		74.50
DynaCalc (disk only)		99.95
Word Pack II by PBJ		134.95
VIP Writer (tape & disk)		69.95
VIP Integrated Library (disk)		149.95

Order any 2 software pieces listed and take 10% off their listed price. All Radio Shack software 10% off list. Send for complete list.

CALL TOLL FREE
1-800-343-8124

- *LOWEST POSSIBLE PRICES*
- *BEST POSSIBLE WARRANTY*
- *KNOWLEDGEABLE SALES STAFF*
- *TIMELY DELIVERY*
- *SHOPPING CONVENIENCE*

VISA AMERICAN EXPRESS MasterCard

computer plus

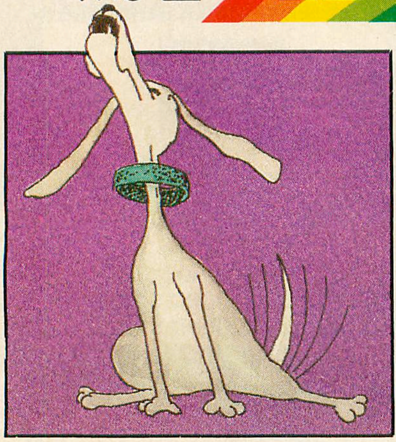
P.O. Box 1094
480 King Street
Littleton, MA 01460

SINCE 1973

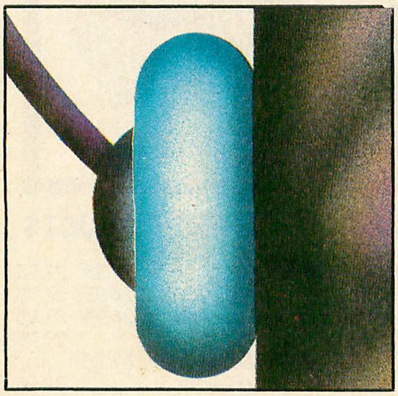
IN MASSACHUSETTS CALL (617) 486-3193

TRS-80 is a registered trademark of Tandy Corp.

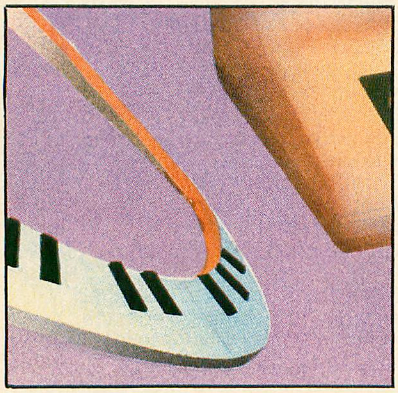
Under The RAINBOW



36



66



122

Cover illustration copyright © 1986 by Fred Crawford

FEATURES

📼 **On Hold**/*Becky F. Matthews* 18
ENTERTAINMENT *Dancing telephones for your delight*

📼 **The Accompanist**/*Barry McNeice* 20
MUSIC UTILITY *Produce sheet music for those creative urges*

📼 **Castle of Doom**/*Scott Halfman* 26
GAME *A challenging test of skills*

📼 **Sing Along**/*Ruth E. Golias* 36
MUSIC ENTERTAINMENT *Recalling old-time movie intermissions*

📼 **CoCoTV**/*Becky and David Matthews* 42
MUSIC VIDEO *"Shadow of the Rings" hits number one*

📼 **Music+ Update**/*Bob Ludlum* 51
MUSIC *Even easier four-part harmony*

Quartz Clock/*Henry C. Gernhardt, Jr.* 54
HARDWARE PROJECT *A "disk clock" for the computer room*

📼 **Sound Processor**/*Dan Tandberg* 62
MUSIC UTILITY *An easy way to create PLAY strings*

📼 **Name That Tune**/*Marge Rutter* 66
MUSIC GAME *An old favorite debuts on the CoCo*

Now You See It . . ./*Marty Goodman* 90
EPROM UTILITY *Determining proper erasure time*

📼 **Disk Expansion**/*Jim Peake* 92
DISK UTILITY *An extra 22K on each diskette*

📼 **Bleeps, Bloops, Bells and Whistles**/*William Mitchell* 108
SOUND UTILITY *Add exciting sound effects to programs*

📼 **Keyboard Piano**/*Martin and Jeremy Spiller* 122
MUSIC *Compose masterpieces on the CoCo synthesizer*

📼 **Pool Maintenance**/*Stephen Snider* 145
HOME HELP *A handy tool for the pool owner*

📼 **The Great Transformation**/*Marty Goodman* 182
DOS UTILITY *Copy MS-DOS files to CoCo disk format*

📼 The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE, ready to CLOAD and RUN. For full details, check our RAINBOW ON TAPE ad on Page 180.

NEXT MONTH: Can it be true? THE RAINBOW turns 5! Our Fifth Anniversary edition will heat up your summer with a festival of features to make the CoCo sparkle, columns that sizzle with hot new ideas and scintillating reviews to spark your interest.

Look for some exhilarating birthday highlights and an extra-special anniversary surprise. We'll also include a complete index to the past year of THE RAINBOW, plus our usual array of games, utilities and graphics.

Don't miss the Fifth Anniversary RAINBOW — come celebrate with us!

COLUMNS

BASIC Training/*Joseph Kolar* 140
Text panel formatting

Building June's Rainbow/*Jim Reed* 16
Managing Editor's comments

Delphi Bureau/*Cray Augsburg* 97
Good times and Marty Goodman's database report

Education Notes/*Steve Blyn* 84
Teaching language idioms

Education Overview/*Michael Plog, Ph.D.* 86
The robot's place in education

PRINT#-2,/*Lawrence C. Falk* 12
Editor's notes

Turn of the Screw/*Tony DiStefano* 101
Investigating the CPU

Wishing Well/*Fred B. Scerbo* 117
Measuring: Another "Life Skill" program

DEPARTMENTS

Advertiser Index 224
Back Issue Information 165
CoCo Cat 168
CoCo Gallery 114
Corrections 220
The Crossword Creator Contest 50
Letters to Rainbow 6
The Pipeline 104
One-Liner Contest Information 136
Rainbow Info 91
Received & Certified 154
Reviewing Reviews 156
Submitting Material to Rainbow 187
Subscription Information 137
These Fine Stores 222

RAINBOWTECH

Barden's Buffer/*William Barden, Jr.* 196
The meaning of "Life"

Downloads/*Dan Downard* 194
Answers to your technical questions

KISSable OS-9/*Dale L. Puckett* 208
The Disk BASIC/OS-9 connection

"Accessible Applications" will return next month.

PRODUCT REVIEWS

Product Review Contents 153

The RAINBOW

June 1986 Vol. V No. 11

Editor and Publisher
Lawrence C. Falk

Managing Editor James E. Reed
Senior Editor Tamara Renee Dunn
Submissions Editor Jutta Kapfhammer
Copy Editor Jo Anna Arnott
Reviews Editor E. Monica Dorth
Editorial Assistants Wendy Falk, Judi Hutchinson, Angela Kapfhammer, Shirley Morgan
Technical Editor Dan Downard
Technical Assistants Cray Augsburg, Chris Wehner
Contributing Editors William Barden, Jr., Steve Blyn, Tony DiStefano, Joseph Kolar, Michael Plog, Dale Puckett, Fred Scerbo, Richard White
Consulting Editors Ed Ellers, Danny Humphress, Belinda C. Kirby, T. Kevin Nickols

Art Director Jerry McKiernan
Designers Jody Gilbert, Tracey Jones, Heidi Maxedon, Kevin Quiggins, Sandra Underwood
Production Assistant Cindy Jett

Chief of Typography Debbie Hartley
Typography Services Jody Doyle, Suzanne Benish Kurowsky

Falsoft, Inc.
President Lawrence C. Falk

General Manager Patricia H. Hirsch
Asst. General Mgr. for Finance Donna Shuck
Admin. Asst. to the Publisher Sue E. Rodgers
RAINBOWfest Coordinator Judy Brashear

Editorial Director James E. Reed
Asst. Editorial Director Jutta Kapfhammer
Creative Director Jerry McKiernan

Chief Bookkeeper Diane Moore
Advertising Accounts Beverly Taylor
Dealer Accounts Judy Quashnock
Accounts Payable/ADP Lisa Ragan
Fulfillment Services Director Bonnie Frowenfeld
Fulfillment Services Asst. Dir. Sandy Apple
Asst. Customer Service Mgr. Beverly Bearden
RAINBOW ON TAPE Production Doug Orr
Word Processor Manager Patricia Eaton
Chief of Printing Services Melba Smith
Pre-press Production John Pike
Dispatch Janice Eastburn
Asst. Dispatch Mark Herndon
Business Assistants Laurie Falk, Sharon Smith, Monica Wheat, Pam Workhoven

Advertising Coordinator Doris Taylor
Advertising Representative Kim Vincent
Advertising Assistant Debbie Baxter
(502) 228-4492

West Coast Advertising and Marketing Office
Director Cindy J. Shackleford
Advertising Representative Shirley Duranseau

For RAINBOW Advertising and Marketing Office Information, see Page 224

THE RAINBOW is published every month of the year by FALSOFT, Inc., The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059, phone (502) 228-4492. **THE RAINBOW**, **RAINBOWfest** and **THE RAINBOW** and **RAINBOWfest** logotypes are registered ® trademarks of FALSOFT, Inc. • Second class postage paid Prospect, KY and additional offices. USPS N. 705-050 (ISSN No. 0746-4797). POSTMASTER: Send address changes to **THE RAINBOW**, P.O. Box 385, Prospect, KY 40059. Forwarding Postage Guaranteed. Authorized as second class postage paid from Hamilton, Ontario by Canada Post, Ottawa, Ontario, Canada. • Entire contents copyright © by FALSOFT, Inc., 1986. **THE RAINBOW** is intended for the private use and pleasure of its subscribers and purchasers and reproduction by any means is prohibited. Use of information herein is for the single end use of purchasers and any other use is expressly prohibited. All programs herein are distributed in an "as is" basis, without warranty of any kind whatsoever. • Tandy, Color BASIC, Extended Color BASIC and Program Pak are registered ® trademarks of the Tandy Corp. CompuServe is a registered ® trademark of CompuServe Inc. • Subscriptions to **THE RAINBOW** are $31 per year in the United States. Canadian rates are U.S. $38. Surface mail to other countries is U.S. $68, air mail U.S. $103. All subscriptions begin with next available issue. • Limited back issues are available. Please see notice for issues that are in print and their costs. Payment accepted by VISA, MasterCard, American Express, cash, check or money order in U.S. currency only. Full refund after mailing of one issue. A refund of 10/12ths the subscription amount after two issues are mailed. NO refund after mailing of three or more magazines.

LETTERS TO THE RAINBOW

Questions?
. . . We have the Answers!

Editor:

I am retired and have been paying into an IRA account. How much is this account worth now? I am going to sell the house that I bought in 1974. How much is it worth today? I need to pour concrete. How much will it take?

All three questions were answered by the April 1986 RAINBOW. Thanks CoCo and RAINBOW.

W.E. Pendergrass
Danville, KY

Editor's Note: Glad you liked our Home Help Issue. Programs referred to can be found on pages 70, 79 and 162.

BACK TALK

Editor:

This is in response to M.S. McPherson's letter in the April 1986 issue [Page 9] about the program by the Delbourgos that creates the image of the earth's rotation (August 1985, Page 73). The spinning of the earth can be easily adjusted by a slight change of Line 180 of Listing 2 (*Pageturn*). By changing the number 40 in the section of the line that says, `"FORT=1TO40"`, you can speed up or slow down the rotation. The smaller the number, the faster the rotation. My preference is `"FORT=1TO190"`. I hope this helps slow down the spinning of Mr. McPherson's world.

Barb Karr
Risingsun, OH

$C0 can be Valid

Editor:

In "A Disk Tinker's Device" in the March 1986 issue (Page 88) Martin Goodman questions the validity of $C0 in the GAT. There are two situations where $C0 is valid.

The first situation occurs when a BASIC program opens two sequential output files for the first time. File number one's first GAT byte is initially $FF. This makes sense because file number one's size is initially undefined. A problem arises upon opening sequential output file number two. The routine that scans the GAT for free granules ($FF's) might accidentally assign to file number two the same granule that was assigned to file number one. To avoid this, file number one's GAT byte is changed to $C0. Its granule is no longer marked free. If the file is closed before any data has been written to it, the first GAT byte will be $C1 because EOF information is written to the file.

Direct access files are similar except that $C0 is initially assigned as the file's first GAT byte. Unlike sequential files, when a direct access file is closed the GAT byte can still be a $C0. Why? A record doesn't have to occupy an entire sector, its size is user definable and a file can have zero records in it, thus occupying no space. A $C0 GAT byte reserves the granule for the file until the first record is written. Why did they choose this method? Disk BASIC design philosophy stressed speed. The GAT is loaded into and read from RAM to speed up GAT intensive operations. The fastest way to define a zero record count and reserve additional granules using only the GAT is by marking them $C0.

On another subject, I have written several professional grade programs for the DISTO 80-column adapter. Interested parties may write to me at P.O. Box 126, 06403, or call (203) 723-8237.

John C. Gazy
Beacon Falls, CT

Cold Shoulder for *EDTASM+*?

Editor:

Thank you for William Frame's letter in the April 1986 issue [Page 7]. I have well over $2,000 in my CoCo and all I see is more money going out.

EDTASM is a good program. I've used all of Mr. Schrag's patches, so I have Disk *EDTASM+*. But, what good is it? All that time and I can't use the *Digital Aquarium* program. Heck, I can't even use D. Lendowski's Vaders!

Maybe what this shows is that Tandy makes the computer but that's it. Face it, a beginner *is* going to choose *EDTASM* because of the cost. We are not all machine language programmers.

I can't say anything bad here. You do what you must, but there are thousands of us with *EDTASM+* only.

When Bill Barden, Jr. says *EDTASM+* is what we're going to use . . . well, that shows me the program is not junk and it deserves more respect than it gets.

Will Computerware's Macro Assembler plus *XREF* (Disk BASIC) allow me to assemble the *Digital Aquarium* listing, which was written on the Micro Works 80C? How do I get *Micro Illustrator* to `SAVEM` to another disk or get the pictures dumped to my CGP-220? I have OS-9. Do I have to get OS-9 screen print utilities? There's nothing in the instructions or program that tells how to get a printer dump. Please help! My address is 525 6th Avenue N #1, 59401.

Jay Thomas
Great Falls, MT

RAINBOWfest Praised

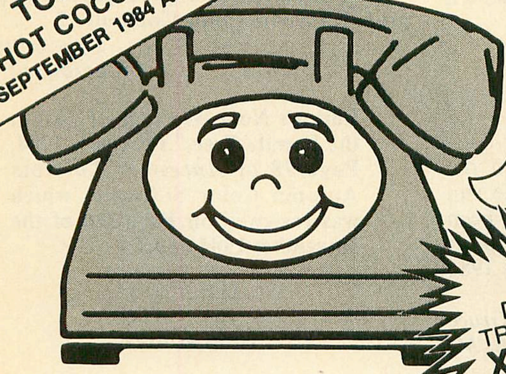
Editor:

This is to say thanks for having RAINBOWfest in Palo Alto. That made it possible for my daughter and me to attend our first one. We enjoyed seeing some of the faces that go with the names on the articles we read. Please don't let the unfortunate weather keep you from having another one in northern California.

I want everyone to know about Moreton Bay Software. John Nielson and his company put customer service and satisfaction above everything else, whether in person or over the phone. You can count on them to resolve any problems. The *Hotslot* program is great fun for us would-be high-rollers!

Norma V. Doyle
Alameda, CA

TOP RATINGS
HOT COCO MAGAZINE
SEPTEMBER 1984 AND MAY 1985



YOU COULD FALL IN LOVE WITH
AUTOTERM!
IT TURNS YOUR COLOR COMPUTER INTO THE
WORLD'S SMARTEST TERMINAL

AND MOST LOVABLE

NEW
DISK FILE TRANSFER VIA
XMODEM

GOOD LOOKIN'

AUTOTERM shows true upper/lower case in screen widths of 32, 40, 42, 51, or 64 characters with no split words. The width of 32 has extra large letters. Scrolling is forward, backward, and fast. Block graphics pictures are displayed automatically and can be scrolled.

The screen's top line shows operating mode, unused memory size, memory on/off, and caps-lock on/off. It also gives helpful prompts.

SWEET TALKIN'

KEY-BEEP can be on/off. Unacceptable keystrokes cause a lower pitched BOP! This ERROR-BEEBOP can be on/off.

Talks to other computers with Full or Half Duplex; Baud Rate of 110, 150, 300, 600, 1200; Parity as even, odd, mark, space, none; 7 or 8 bit Word; any Stop Bits; all 128 ASCII characters; true line Break; XON/XOFF protocol; and optional line-at-a-time transmission. Able to send and receive text, block graphics, BASIC and ML programs. A 64K machine holds up to 45,000 characters (33,300 in HI-RES).

DUAL PROCESSING lets you review & edit while more data is coming in.

XMODEM for disk file transfer.

Fully supports D.C. Hayes and other intelligent modems.

Talks to your printer with any page size, margins, line spacing, split word avoidance. Embed your printer's control sequences for boldface, underlining, etc. Narrow text can be automatically spread out.

You'll also use Autoterm for simple word processing and record keeping

You can display directories, delete files, transmit directly from disk, and work with files larger than memory. Easily maintain a disk copy of an entire session.

Compatible with TELEWRITER (ASCII) & other word processors.

SMOOTH WALKIN'

AUTOTERM moves smoothly and quickly between word processing and intelligent terminal action. Create text, correct your typing errors; then connect to the other computer, upload your text, download information, file it, and sign-off; then edit the received data, print it in an attractive format, and/or save it on file.

Editing is super simple with the cursor. Find strings instantly, too! Any operating parameter, such as screen width, can be altered at any time. Uncompleted commands can be cancelled.

PUTTY IN YOUR HANDS

The word processor can be used to create, print, and/or save on file your personal KSMs. They let AUTOTERM act like you. For example, it can dial through your modem, sign-on, interact, perform file operations, & sign-off; an entire session without your help. KSMs can answer the phone, prompt the caller, take messages, save them, hang-up, and wait for the next call. The KSM potential is unbelievable!

NO OTHER COMPUTER IN THE WORLD CAN MATCH YOUR COCO'S AUTOMATIC TERMINAL CAPABILITIES!!!

WHAT THE REVIEWERS SAY

"AUTOTERM is the Best of Class."
Graham, *RAINBOW*, 6/83

"The AUTOTERM buffer system is the most sophisticated — and one of the easiest to use..."
Banta, *HOT CoCo*, 9/84

"Almost a full featured word processor..."
Ellers, *RAINBOW*, 11/84

"AUTOTERM's excellent error-handling routines, thorough documentation, and logical, easy-to-use command structure make it stand out."
Parker, *HOT CoCo*, 5/85

AVAILABLE IN CANADA
from
Kelly Software Distributors
Edmonton, Alberta

CASSETTE $39.95
DISKETTE $49.95
Add $3 shipping and handling
MC/VISA/C.O.D.

PXE Computing
11 Vicksburg Lane
Richardson, Texas 75080
214/699-7273

Please hire the mentally retarded. They are sincere, hard working and appreciative. *Thanks!* *Phyllis.*

HINTS AND TIPS

Editor:

I would like to inform Canadian CoCo users of the ACCESS Timesharing System. It is similar to Delphi and CompuServe only it's Canadian and much cheaper. The cost is $5.95 an hour CDN including all charges. There is a special CoCo SIG on the system so we can all communicate. To log on, call up your local Datapac number and type the following:

```
49700019 (ENTER)
(ENTER)
HELLO DEMO.DEMO (ENTER)
```

This gives a description of the system and the option of signing up online. You may also call them at (514) 342-8147. I hope to see more CoCo users on the system soon.

Kanti Dinda
Kingston, Ontario

Printer Upgrades Available

Editor:

RAINBOW is great! In the March issue you printed my question and soon after I got five good answers.

I asked for information on an upgrade for the Epson RX-80 printer to allow it to print near-letter quality as in the current LX-80 model. Here's where you can get an upgrade kit for $59.95: Dresselhaus Computer Products, 837 E. Alosta Ave., Glendora, CA 91740, phone (818) 914-5831. The product is called the "Fingerprint Letterwriter." Kits are also available for the Epson FX series for $79.95.

Paul Whiting
Madison, WI

Timing Subroutines

Editor:

Here's a tip on timing subroutines. First, type in and run:

```
10 TIMER = 0
20 X = TIMER
30 PRINT X
```

This gives a readout in $^{1}/_{60}$ seconds of how much overhead the test lines take. Write it down. Insert program subroutine between lines 10 and 20 (put them into the program at odd-numbered positions so they can be removed later). Subtract the overhead (first figure obtained) from the second figure. This tells how long the routine takes to run in $^{1}/_{60}$ seconds. Multiply by 60 to get seconds. This could be included in Line 30.

B.R. Pogue
Lake Havasu City, AZ

RAINBOW ON DISK Vote

Editor:

I heartily endorse the suggestion to have a RAINBOW ON DISK subscription. I also request that you publish a comparison chart for database manager programs, similar to that done for printers a few issues back.

James M. Green
Jacksonville, FL

Belated Congratulations

Editor:

What happened to "CoCo Cat" in the April 1986 issue of RAINBOW? Has he run away? I see that Jerry McKiernan has been promoted from assistant art director to art director beginning with the February 1986 issue. A belated congratulations!

William T. Grace
St. Joseph, MI

REQUEST HOTLINE

Editor:

I am interested in purchasing any trivia on cassette tapes. I have searched all over and can only find them on floppy disks. Please help. Write to me at 25517 Yale, 48125.

Steve S. Massey
Dearborn Heights, MI

Can You 'Spare' any Bowling Software?

Editor:

I am trying to locate software to handle my bowling league records. I would also like to be able to keep records for tournaments in which three, four or five games are bowled. I have a 64K CoCo. If you or any of your readers have such a program or know where this type of software is available please let me know. I would be interested in hearing about or seeing a sample printout of bowling league software. My address is 2416 Main Street, P.O. Box 78, 44856.

Nancy F. James
North Robinson, OH

Ups and Downs

Editor:

I have been following biorhythms for several years now using a book written by Bernard Gittelson entitled *Biorhythms — A Personal Science*. I have found several programs in other computer magazines that profess they have a program for biorhythms, but to no avail. These programs don't even come close to comparing to the charts in Gittelson's book. Perhaps you have a past issue of your magazine that has a program for a biorhythm chart. My address is 1101 Tyler, #23, 66612.

R.D. Phillips
Topeka, KS

Editor's Note: See the reviews "Biorhythm and Mine Field" February 1982, Page 10 and "Biorhythm" June 1982, Page 52. Also "How's Your Day? Need Biorhythm help?" November 1981, Page 6.

Family Ties

Editor:

I am looking for a good genealogy program for a 64K Color Computer 2 . . .

Kyle Johnson
Cantoment, FL

Editor's Note: We suggest "All in the Family Tree," February 1984, Page 78 or *Ancestors 2.0* from Autumn Color Software, which was reviewed on Page 218 of the November 1984 issue.

New Address

Editor:

If anyone has questions about or wants a copy of my program, *Guppy Graphics*, from the October 1985 issue, Page 106, send $6 to my new address: 739a 16th Avenue, 94118. I'm sorry the RAINBOW ON TAPE version didn't work. Also, I hope you put out RAINBOW ON DISK soon.

Jim Kent
Dancing Flame Software
San Francisco, CA

Delphi Line

```
From: BOSIB::COLOR
To:   EDITORS
Subj: IDEA

  How about a section for "K-
BYTERS"? They are small programs
like one-liners, but can have any
amount of lines in them and can only
take up 1K of memory.
                         Royal O'Brien
                         Riverside, NJ
```

INFORMATION PLEASE

Editor:

After many hours of trying to modify the screen dump for the excellent *CoCocad* program by Peter Kerckhoff (October 1985, Page 130), I give up.

Mr. Kerckhoff was of great help in sending me the modifications for the DMP-type printers, however, even those did not work with my DMP-105. The modification printed in THE RAINBOW (February 1986) will not work using my DMP-105 printer. I would like to know if anyone has made a machine language print routine that works using the DMP-105 printer for *CoCocad*. My address is 1137 Caddock, 68008.

R.W. Harper
Blair, NE

A Touching Request

Editor:

I just purchased a touch pad. They come with almost no documentation. I would greatly appreciate it if someone could send me some information and/or program suggestions. Send information to 741 Alicia Walk, Apt. E, 44306.

Keith Selbee
Akron, OH

Editor's Note: See "Joysticks, Touch Pads and Digitizing the World" on Page 224 of the January 1986 issue.

OS-9 Upgrade

Editor:

I bought my 64K Extended BASIC CoCo 2 about five months ago. Your magazine has encouraged me to upgrade with an FD-500 disk drive and a DMP-105 printer. And I have also made the commitment to OS-9.

I am using the tape version of *Elite*Word* and I plan to upgrade to the OS-9 version soon. But, there are times when the program hangs up and I see a rampant cursor bar flashing back and forth on the last line of text. If anyone is using *Elite*Word* OS-9, I would appreciate hearing from them, since I am not sure which OS-9 word processor to use. Write to me at 10-B Summer Street, 94102.

Shawn Thomas
San Francisco, CA

Get in Touch

Editor:

I would like to contact someone who has a communication program for the DCM-3 modem. I have the *Color Disk Scripsit* for the DMP-105 printer, and I also have some games for the CoCo. Anyone interested please write to me at 4421 NW Second, 33126.

Walter Traini
Miami, FL

Editor's Note: Any communications package should work.

Voltage Change

Editor:

I now have a Disk Extended Color BASIC 1.0, 32K CoCo. I bought a new CoCo 2 and cannot get my disk to operate. I understand they have changed the voltage to the control. Is there some way I can adapt my old control to operate with the new CoCo 2?

Ronald M. Pierce
Ft. Lauderdale, FL

Editor's Note: Tony DiStefano describes how to build a 12-volt power supply for the CoCo 2 in the April 1984 issue on Page 149.

Using DMP-105 Fonts

Editor:

I have found Tandy's *Color Scripsit* to be very useful. However, I was disappointed when I found it impossible to utilize the various fonts available from my DMP-105 printer. Am I missing the obvious or has anyone found a way around this problem?

Jerry Dummer
Los Alamos, NM

Editor's Note: You might try poking control codes to the printer immediately before running *Scripsit*. This assumes you are using the disk version of *Scripsit*.

Calling Modem Programmers

Editor:

I recently bought a Radio Shack DCM-5 modem. The manual says the modem can be programmed for automatic operation. It describes automatic as "having the modem call another computer at a desired time." I would like to use this feature to transmit files, but I don't know how. I don't know assembly language and the modem can only be programmed when it is in a terminal program with the settings at seven data bits and full duplex. If anyone knows how to do this, please let me know. My address is 435 8th Street NE, 33881, phone (813) 293-5648.

Thomas C. King
Winter Haven, FL

Double Duty Drive

Editor:

Please tell me if it is possible to use both sides of a double-sided disk in a single-sided disk drive. I have a Radio Shack slim-line Drive 0 and I've tried cutting the write-protect notch on the opposite side of the disk. I've been able to cut a pretty good duplicate of the notch on the other side and in the correct location. My 64K CoCo keeps telling me I/O Error when I try to format that side of the disk. I've heard of people who have single-sided disk drives using both sides of double-sided disks. How can this be done?

Jose Garcia
Mooresville, NC

Editor's Note: See "Downloads," April 1986, Page 225, for the answer to this question in reply to a letter from Kevin Gibson.

EPROM Changes

Editor:

Is there any program for the CoCo so when it is turned on it automatically loads a program from disk? If anyone has any program like this, I can be reached at #8 Sylvan Heights, 52601.

Scott Lindsey
Burlington, IA

Editor's Note: Check out our "Cooking with CoCo" series beginning in July 1984 and ending in February 1985. What you want will require that the changes this series makes be burned into an EPROM.

Reading Bar Codes

Editor:

Where can I get a Bar Code reader that is usable on my upgraded CoCo 2 with double disk drive? I prefer a wand, although other versions might do. I want to scan, then print out information with a small Tandy thermal printer. Write to me at 2927 Allen, 63104.

Barbara Gardner
St. Louis, MO

Selling Programs

Editor:

I am an assembler at an electronics firm and have written a program to print the disk directory. I would like to sell the program but I don't know how to go about it. Any advice would be a great help.

James C. Anderson
Ft. Atkinson, WI

Editor's Note: We suggest you call or write to the various software houses. You might find one who might be interested. You are always invited to send it to us. See "Submitting Material to Rainbow" on Page 120 of this issue.

KUDOS

Editor:

A special thanks to Fred Scerbo for his *Title Maker* program [Page 157] in the March 1986 issue. I had been unsuccessfully trying to do that with joystick and keyboard programs. I am the membership director for the London CoConuts Computer Club and we promote your magazine whenever possible.

Doug Tompkins
London, Ontario

BULLETIN BOARD SYSTEMS

Editor:

I would like to inform your readers of my COBB's BBS #41. It is online from 8 a.m.-8 p.m., CST, seven days a week, 300 Baud, no parity, eight bits and one stop bit. The number to call is (501) 857-3138.

Perry Parsons
Corning, AR

- This is to announce a new BBS. The Classified Connection is online 24 hours a day at (619) 566-1745. Users may access 300 Baud only. The board is primarily dedicated to TRS-80 Color Computer users. The emphasis being buy/sell/trade hardware and public domain software and assorted other articles in a swap-and-shop forum. There is a unique art forum for the submission of public domain artwork written by Color Computer users and downloadable in XMODEM format.

Bill Kennon
San Diego, CA

- Our TBBS is running 11 various CoCo sub-boards with four separate up/download software bases. Members receive a monthly newsletter that contains a BBS list, pokes page, news section with the latest happenings from CompuServe, Delphi and other branches of the CoCo world. We will also be holding monthly meetings where

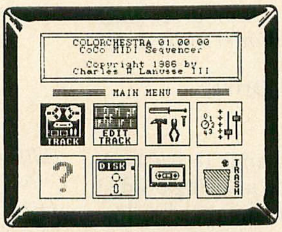
What Happens When You Own A
COLORCHESTRA™ MIDI SEQUENCER?

All Of A Sudden, Synthesized Music Production, Editing And Recording Becomes Very, Very Simple.

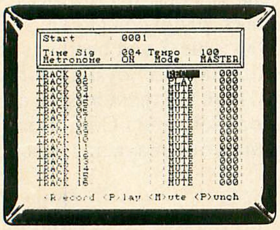
COLORCHESTRA, (from the author of CoCo MIDI), links together your Tandy 64K Color Computer and MIDI equipped keyboard synthesizer or rhythm drum machine and makes it simple to create masterpieces of music.

By incorporating menus and graphic icons, all there is to recording in real time is pushing a few keys.

A. Select track recording icon.



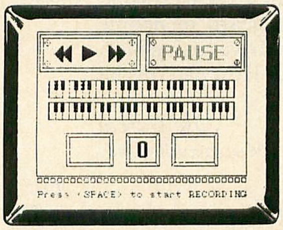
```
COLORCHESTRA 01.00.00
CoCo MIDI Sequencer

Copyright 1986 by
Charles R Lanusse III
```



```
Start        : 0001
Time Sig     : 004 Tempo : 100
Metronome    : ON   Mode : MASTER
TRACK 01 :        :      : 000
TRACK 02 :        : PLAY : 000
TRACK 03 :        : MUTE : 000
TRACK 04 :        : MUTE : 000
TRACK 05 :        : MUTE : 000
TRACK 06 :        : MUTE : 000
TRACK 07 :        : MUTE : 000
TRACK 08 :        : MUTE : 000
TRACK 09 :        : MUTE : 000
TRACK 10 :        : MUTE : 000
TRACK 11 :        : MUTE : 000
TRACK 12 :        : MUTE : 000
TRACK 13 :        : MUTE : 000
TRACK 14 :        : MUTE : 000
TRACK 15 :        : MUTE : 000
TRACK 16 :        : MUTE : 000
<R>ecord <P>lay <M>ute <P>unch
```

B. Select starting measure, time signature, tempo and recording track.

C. Simply play keyboard and hit break key when done.



```
Press <SPACE> to start RECORDING
```

THAT'S IT!

Once the track is entered, auto correction, transposing, and filtering may be implemented. And **COLORCHESTRA™** works with you to record up to **8,000 notes** utilizing as many as **16 tracks**...awesome.

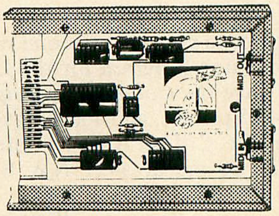
But it doesn't stop here - **COLORCHESTRA™** is crammed with a myriad of other outstanding professional features...

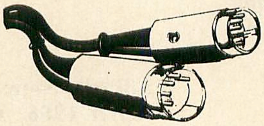
- ✓ Solo capabilities on any track.
- ✓ Tempo range from 30-250 beats per minute
- ✓ Audible and visual metronome
- ✓ Programmable measure locator
- ✓ Sequencer will record from any MIDI Channel (1-16)
- ✓ Each track can output to any MIDI channel (1-16)
- ✓ Records full spectrum of MIDI data including program changes, pitch bends, all 128 MIDI controllers (modulation wheel, breath controller, sustain pedal, etc.)
- ✓ Will sync to drum machines
- ✓ MIDI thru on input
- ✓ Programmable time signature
- ✓ Track looping capability
- ✓ Real time velocity modification
- ✓ All 16 tracks can be titled
- ✓ Software filter removes specific MIDI parameters from recorded music such as pitch bend, program change, velocity data, modulation wheel, MIDI controller
- ✓ Simple music text editor
- ✓ Transposition of notes up or down any number of octaves in half steps
- ✓ Auto correct feature for timing errors
- ✓ Stores composed music on tape or diskette
- ✓ Works with any disk operating system (Radio Shack, JDOS, ADOS, etc.)

THE COLORCHESTRA SYSTEM PACKAGE

HARDWARE

Encased between clear plastic panels and hand finished american walnut is **COLORCHESTRA's** sequencer board. Not just the edge connector, but every circuit trace is plated in 7mil gold for optimum interface connection.



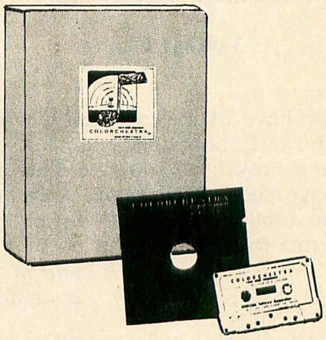


Two dependable, heavy duty 8' MIDI cables with metal jacketed end connectors are included.

SOFTWARE MEDIA

In addition to the hardware cartridge and cables, the **COLORCHESTRA™** System Package includes type set documentation in its own ring binder for easy reference and updating.

And for your convenience, both tape and diskette are supplied-so, if you need a back up it'll be there.



COLORCHESTRA™. A simple answer to your MIDI music production and HORIZON puts it all together for an introductory price of **149.95.........**

COLORCHESTRA™ system complete - $149.95. Call any day (ex. Sun.) to order. We ship same day. We accept check, COD, Visa, Master Card. Shipping add 3.00, COD add 2.00. Louisiana residents add 7.8 sales tax. Call for audio demonstration.

COLORCHESTRA Copyright 1985 C.W. Lanusse III.

HORIZON
SOFTWARE CORPORATION

318-942-1938 P.O. Box 289 Opelousas, Louisiana 70570 members can access our program library. For more information call (408) 867-2823 (Allan Schaffer), (408) 923-2967 (John Say) or our TBBS at (408) 253-6293.

John Say
San Jose, CA

- Would you please announce the completion of The French Underground BBS. Its down time is weekdays 3 p.m.-7 p.m. (Central time zone) and weekends 10 am.-7 p.m. The number is (319) 388-0381.

Dave France
Davenport, IA

- Fast Trackin' BBS has a new phone number. Call me at (502) 365-7771. We are still in operation 24 hours a day; currently running at 300 Baud.

David Guess
Princeton, KY

- Bob's Corner BBS is up 24 hours a day. It is a Colorama Version 3.04 and has been running over a year. It has a small users log of 70 callers. We have online games, up/downloads, full magazine, graphics, story, large message base, open club section and a sub-BBS for amateur radio operators. Call (617) 889-0777 BBS, (617) 889-0056 Voice.

Bob Bohn
Chelsea, MA

- The Frisky CoCo BBS is a 300/1200 Baud system, online 24 hours a day, seven days a week and has downloads of all kinds. It is an extensively modifed Colorama (Ceretek Inc.). Call (816) 436-2904.

Jerry Oliver
Kansas City, MO

- Introducing Colorama, online from 7 p.m. to 12 midnight daily. Call (601) 795-8915. For more information call before 7 p.m. for voice.

Joe Polk
Poplarville, MS

- My BBS runs on a 64K 'E' CoCo, four drives, Deluxe Pak, Hayes 1200 and a homemade hardware clock. ASCII and XMODEM transfer is available with 30-40 programs online for downloading along with hints, reviews, bulletins, games and trivia. New users are not limited to any activity except writing on the system. We are up and running 24 hours a day, seven days a week, 300/1200 Baud, eight data bits and can be reached at (603) 485-8682.

Dave Bean
Allenstown, NH

- The Hotel BBS operates 24 hours a day, seven days a week. We feature SIG sections such as a health, gourmet, magazine, want ads and a great download section that has Mike Ward's *Mikeyterm 4.0* (c) online to download. Give us a call at (718) 381-2209.

Mike Sileo, Jr.
Glendale, NY

- I would like to inform your readers of a BBS in the Westchester-Rockland-Putnam area. The BBS supports a variety of systems including CoCo. It includes many SIGs and even a UFO section. The boards are up from 6 p.m.-7 a.m. weekdays and 24 hours on weekends; has a download section for CoCo and IBM. Call (914) 776-2424.

Jolly Roger
Lake Carmel, NY

- Announcing The Utopia Network #1 BBS. We are using our own written software. To log on use 300 Baud, full duplex and even parity. We have over 200 programs available for download and several other features. The hours of the BBS are from 7 p.m. to 6 a.m. every evening.

Bruce Uher
Coshocton, OH

- I would like to announce a BBS called the FUN BBS. It has movie reviews, top 10 music, supports up/downloading, has online games and more. It runs on a three-drive CoCo with 64K. The number is (412) 378-7825 and is usually up 24 hours a day.

Robert Chalupa
Aliquipa, PA

- I would like to announce the changing of CoCo Palace's number. The new number is (615) 581-9752. Voice calls will be taken on (615) 581-2904. I am changing to a new BBS program. I am also interested in starting a national club for SysOps. Address all correspondence to 936 Hall Drive, 31784.

Marty Cline
Morristown, TN

- The Salt City CoCo Club announces it has a BBS — runs 24 hours a day, seven days a week, 300 Baud, seven bit, no parity. Call The Data Warehouse at (801) 487-6787.

Salt Lake City CoCo Club
Salt Lake City, UT

- Announcing the online operation of the Bellingham CoCo Bulletin board from 10 p.m. to 7 a.m., seven days a week. Call (206) 734-5806.

Roger Alexander
Bellingham, WA

- Announcing Uncle Dave's BBS in operation at 300 Baud, 24 hours a day, seven days a week. Supports up/downloading and various message bases. Call (414) 843-4029.

David Buehn
Salem, WI

- I would like to announce the start of the Wizard's Keep BBS. The number is (604) 752-2480. It runs 24 hours a day at 300/1200 Baud.

Jason Cikaluk
Qualicum Beach, British Columbia

- I would like to inform your readers of the all new Micro Ads BBS. We operate 24 hours a day, seven days a week. Parameters are 300 Baud, eight data bits, one stop bit and no parity. Phone (604) 832-8772.

David Coldwell
Salmon Arm, British Columbia

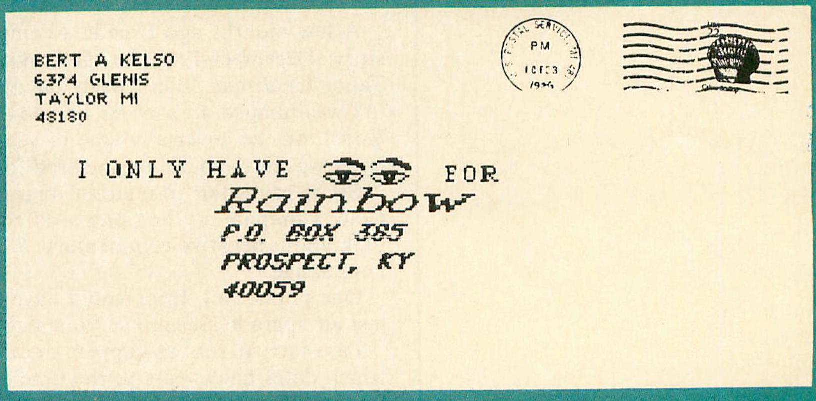
- CoBBS #63 is online and running 24 hours a day. This system supports up/downloading, two message bases, for sale sections and much more. Call (705) 328-0703. If the system is down for housekeeping, etc., the phone online is not answered to ensure charges are not made.

Bud Melless
Lindsay, Ontario

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

Letters to the editors may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`.

ARTS AND LETTERS



Envelope of the Month

Bert A. Kelso
Taylor, MI

PRINT#-2,

I have seen a great deal about "desktop publishing" in the past months and, I suppose, the ultimate bombardment came just the other day when we received a baker's dozen promotions for Apple's new Macintosh.

I don't know what it cost to produce the package, but — based on what we pay for much more modest mail campaigns — I would guess it was in the neighborhood of $10 each. That means Apple spent about $130 sending Falsoft and its associated companies promotion material trying to convince us that the Mac could be used in place of our typesetting equipment. With the exception of a few printing shops, I know of almost no one who uses the still-very-slow Mac for typesetting.

Hooked up to an Apple LaserWriter printer (which, incidentally, costs much more than an HP or Corona LaserJet) you can get acceptable "type," but at a slow speed. And digitized images are a poor second to photographs. Color? Forget it.

There is, however, a magazine that was founded on the general principle of desktop publishing. You are reading it. For the first year, THE RAINBOW was done entirely with a Color Computer and a dot-matrix printer. Can you still do this? Well, ask all the people who use their CoCo for newsletters of all types.

After several years, I see Apple as still trying to find a niche for its Mac. So far, no go. A computer, after all, has two purposes. The first is to make things easier for its human companion. The second is to make things enjoyable. No one will ever convince me that a Mac does these things best — simply because it works so slowly. And, if it is slow to react, I can hardly say it is enjoyable. Many of Mac's games are good, but good games don't suffice for lack of other attributes.

I think Apple should just let Mac go away quietly. Or reduce the price drastically. And that would be easy: I could have saved them $130 just by telling them not to send us 13 mailers for something we are hardly interested in using.

* * *

Speaking of mailings, our policy is that we make just one for subscription renewals. No, we're not like some other magazines that run a series of six or so mailings to get your renewal. I always find those renewal notices a bore and "tune out" on them after a while. After all, I figure that, eventually, they make their "last, best offer" and it is silly to renew before then.

We don't take that attitude. Instead, we figure you like THE RAINBOW (most of you seem to) and if you get a notice to renew, you will. We do include a note that says the notice you're getting is the *only* one you'll receive.

Since we seem to have one of the best renewal rates in the industry, maybe we do something right. On the other hand, every month we get notes from people who let their subscription lapse and want us to pick it back up with the issue after the last one they got. This frequently happens when someone sees the new issue on the newsstand or at a friend's home.

We can't do that. The reason we are able to keep our subscription price where it is is because we mail all our magazines at the same time on a second class permit. It costs a couple of dollars to mail one first class — and that's more than the profit on a whole year. (Yes, we will mail first class when you miss an issue.)

So, please, send in your renewal notice when you get it. That way, you'll be sure to keep THE RAINBOW coming without a break.

* * *

A few months ago I made a comment in our sister publication, **PCM**, that our cover story (December 1985) on the Tandy 3000 and 600 marked the first time I knew of that Tandy Chairman John Roach had appeared on the cover of a computer magazine.

I was jumped all over by Eric Maloney, editor of *80-Micro*, because his magazine had Roach on the cover a couple of years ago. A correction was duly made in **PCM**. Eric's letter was to the point on the need for accuracy in journalism.

So, it seems fair-to-middlin' strange to see *80-Micro* describe a simple upgrade for the Color Computer as the "long-awaited successor to the Color Computer 2" in its May issue. Talk about negative commentary: *80* went through a short list of all the things Tandy did not change.

One phone call, Eric, would have told you this was not the new Color Computer. It is just an upgrade. Seems everyone knew about it but you.

I am sorry to see this happen, since it reinforces the magazine's disinterest with the CoCo, which dates back years to the time *80-Micro*'s founder and then publisher Wayne Green forecast the "death" of the machine that went on to be Tandy's top seller. I am even more sorry because now that *Hot CoCo* has folded, *80* purports to support the CoCo.

To paraphrase Henny Youngman: "Support like this, I don't need."

— Lonnie Falk

Telewriter-64™
the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

Cognitec
704 Nob Street
Del Mar, CA 92014

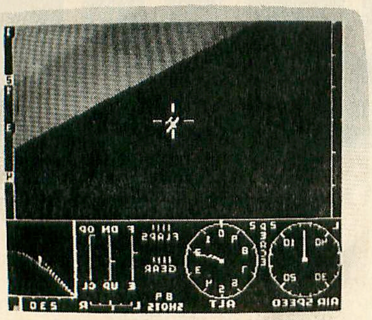
Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited. (Add $2 for shipping. Californians add 6% state tax.)

Available at
Radio Shack stores
via express order
catalogue #90-0253
90-0254

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

RAINBOW
CERTIFICATION
SEAL

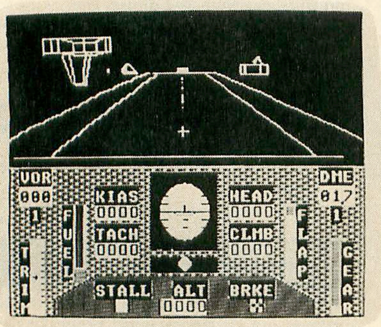
TOM MIX'S MINI-CATALOG



P-51 Mustang Attack/Flight Simulation

The ultimate video experience! Link two CoCo's together by cable or modem, and compete against your opponent across the table OR across the country! (Both computers require a copy of this program). The P-51 flight simulator lets you fly this WWII attack fighter in actual combat situations—against another player OR against the computer.

32K Machine Language
Flight Manual Included
Tape $29.95 Disk $34.95



Worlds of Flight Small Plane Simulation

Real-time simulation generates panoramic 3-D views of ground features as you fly your sophisticated plane in any of nine different "worlds." Program models over 35 different aircraft/flight parameters. Realistic sound effects too! Manual included helps you through a typical short flight.

32K Machine Language
Flight Manual Included
Joysticks Required
Tape $29.95 Disk $34.95

Educational Best-Sellers!

Teachers Database II—Allows teachers to keep computerized files of students. Recently updated with many new features!

- Up to 100 students, 24 items per student
- Many easy-to-follow menus
- Records can be changed, deleted, combined
- Statistical analysis of scores
- Grades can be weighed, averaged, percentaged
- Individual progress reports
- Student seating charts
- Test result graphs/grade distribution charts

64K TDBII $59.95 Disk Only
32K TDBI $42.95 Tape $39.95

Fractions—A Three-Program Package. 1/Mixed & Improper 2/Equivalence 3/Lowest Terms. Practice, review and definitions make learning easy.

32K Ext. Basic
Tape $30.95 Disk $35.95

Factpack—Three programs for home or school use provide drill and practice with basic "-/+/÷/x" Grades 1-6.

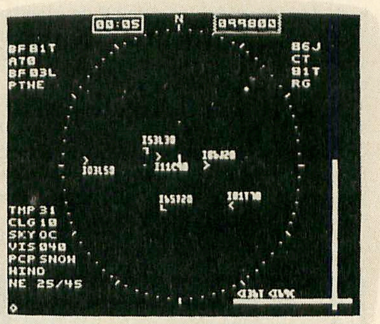
32K Ext. Basic
Tape $24.95 Disk $29.95

Vocabulary Management System—Helps children learn and practice using vocabulary and spelling words. Eleven programs including three printer segments for tests, puzzles, worksheets and five games; many features make this a popular seller!

Requires 16K Ext. Basic/
32K for Printer Output
Tape $39.95 Disk $42.95

Math Duel—A challenging math game that pits you against the computer in a game of wits. Use your knowledge of factors, multiples and prime numbers to gather points against your CoCo.

32K Ext. Basic
Tape $30.95 Disk $35.95



Approach Control Simulation From Betasoft Systems.

"Caught in a blinding snowstorm, two jet airliners are on a collision course. The pilots are unaware of the imminent danger. Hundreds of lives are at stake. A high-speed disaster is inevitable unless you act fast..." This and many other exciting scenarios await you as an Air Traffic Controller. The thrills, challenges and frustrations you'll experience with this authentic, real-time simulation will give you countless hours of discovery and adventure.

32K Machine Language
Tape $29.95 Disk $34.95

We Have More Software Available Than Listed Here. Please Write for a Free Catalog!

Unique Utilities!

New! Use the tools we've used to create "Donkey King," "Sailor Man" and others!

- Full use of 64K RAM
- 100% Machine Language
- No ROM Calls
- Selectable Drive
- Support 1-4 drives
- Menu Selected functions
- "Cold Start" exit to Basic
- Parameters easily changeable in basic loader

MAS Assembler—the finest ever! (Includes EDT)

Disk $74.95

EDT—Effortless full screen editing w/2-way cursor. Text files to 48K+. Copy, save, move, delete, print blocks, much more!

Disk $39.95

Deputy Inspector—Alphabetize, resort and backup directory; fast 3-swap backups, copy files or programs, auto-reallocate granules during backup for faster loading, more!

Disk $21.95

Sector Inspector—Alphabetize, backup and print directory; repair crashes, LLIST basic programs, read in and edit 23+ grans, much more!

Disk $29.95

New! Tandy 1000/1200/3000 -IBM/PC-Compatable Software!

Inventory Mate --General purpose inventory program suitable for a variety of applications. Inventory turnover and transactions are kept on permanent record. Has automatic item count adjustment when shipping or receiving. Also generates reports suitable for many uses! **$79.95**

Postal Express --Lightning-fast general purpose mail program for home, small business. Each file stores up to 500 entries; in-memory storage for quick operation; automatic selective printing options using global search and categorizing features; Zip Code ordering, alphabetizing, accepts 9-digit and foreign Zips as well! **$49.95**

Special Delivery --Comprehensive mail list program for businesses, featuring versatility found only in much more expensive packages! Up to 2000 entries held in each file; additional address line can be placed anywhere in the individual mailing label; categorize and print entries according to custom needs; Zip Code ordering, alphabetizing, uses 9-digit and foreign Zips, too! **$79.95**

More Tandy-IBM/PC software available.

TM

TOM MIX SOFTWARE
4285 Bradford N.E.
Grand Rapids, MI 49506
616/957-0444

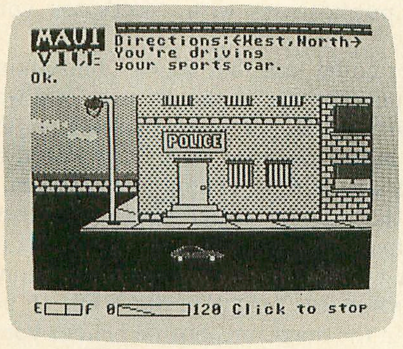
Ordering Information

- Call us at 616/957-0444 for Charge Card orders
- Add $3.00 postage and handling
- MI residents add 4% sales tax
- Authors—We pay top royalties!

MasterCard
VISA®

Look What's New at NOVASOFT!

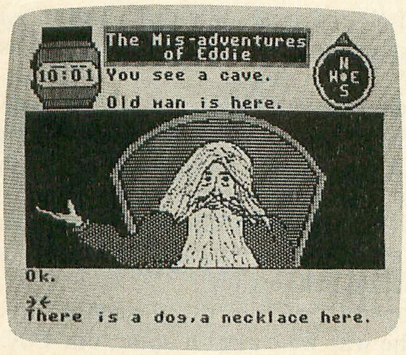
Top-quality software at affordable prices, written by well-known authors in 6809 Machine Language


MAUI VICE
Directions:<West,North>
You're driving your sports car.
Ok.
POLICE
E F 0 120 Click to stop

New Release
Maui Vice

Step into the shoes of Crockett & Tubbs, and gather evidence, photographs and witnesses to convict your suspects! With "windows" to select your options, hi-res graphics, and a new story generated each time you play. This is state-of-the-art that guarantees excitement and newness every time you play.

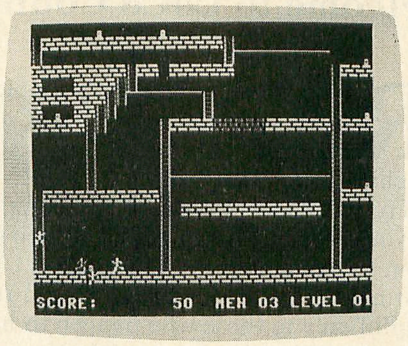
64K Ext. Basic & Joystick Required
Disk $21.95


The Mis-adventures of Eddie
10:01
You see a cave.
Old man is here.
N
W E
S
Ok.
There is a dog, a necklace here.

The Misadventures of Eddie

Another great Novasoft adventure. The ol' man in the mines' rebellious son, Eddie, is roaming through time, creating havoc—and you must bring him home in order to return to your own time! Over 140 locations, 50+ commands, in hi-res graphics. Experienced adventurers will love this one!

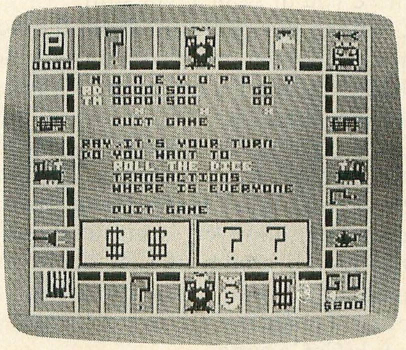
Requires 64K
Disk $21.95


SCORE: 50 MEN 03 LEVEL 01

Goldrunner

Travel the maze in your never-ending search for gold—but beware of trap doors, burly guards and other hazards! 33 screens.

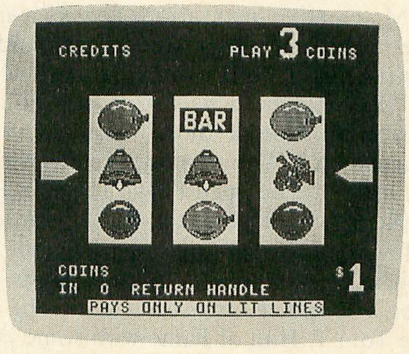
64K Joystick or Keyboard
Tape $14.95 Disk $17.95


MONEYOPOLY
00001500 GO
00001500 GO
QUIT GAME
RAY, IT'S YOUR TURN
DO YOU WANT TO
TRANSACTIONS
WHERE IS EVERYONE
QUIT GAME
$ $? ?
GO $200

Moneyopoly

Play the popular board game on one of the most realistic computer game simulations ever! Contains all the features of the original. Buy, sell, rent, wheel & deal your way to fortune.

32K Joystick Required
Tape $19.95 Disk $22.95


CREDITS
PLAY 3 COINS
BAR
COINS IN 0
RETURN HANDLE
$1
PAYS ONLY ON LIT LINES

Vegas Game Pak

Six games in all! Blackjack, Keno, Video Poker & 3 slot machine lookalikes. Super graphics!

16K Ext. Basic Required
Tape $24.95 Disk $27.95

Other Best Sellers

Martian Crypt—Life once existed on Mars! Find the hidden Martian crypt. Animated hi-res graphic adventure with sound effects.

32K Tape $18.95 Disk $21.95

Skyway—Manuever your craft along the skyway avoiding enemy craft, mines, sky bugs and holes! 32K and Joystick.

Tape $19.95 Disk $22.95

Blackbeard's Island—Find Blackbeard's treasure but be ever mindful of the hazards along the way. Graphic adventure.

32K Disk $19.95

Brewmaster—Move along the end of the bars, serving beer to your thirsty customers. Fast-paced action. 32K & Joystick.

Tape $14.95 Disk $17.95

CoCo Crosswords—Master set has 27 puzzles, four levels of difficulty. Pull down menu. Additional sets have 30+ puzzles each.

32K Master Set Disk $24.95
Sets #2, #3, #4 just $12.95 ea. on Disk

Color Car—Fast moving racing lets you "bump & jump" other racers through the course.

64K & Joystick. Tape $19.95 Disk $22.95

Tom Mix Products at New Reduced Prices!

Sailor Man—Defeat the bigfatbadguy and win Elsie's heart. Super graphics.

64K Tape $24.95 Disk $27.95

Dragon Slayer—Defeat the dragon by finding your way through a mountain maze. Gather treasure but avoid the deadly traps! 160 exciting screens.

32K & Joystick or Keyboard
Disk $24.95

The King—
32K Tape $24.95 Disk $27.95

Draconian—
32K Tape $19.95 Disk $22.95

Ms. Maze—
32K Tape $19.95 Disk $22.95

Kater Pillar II—
16K Tape $19.95 Disk $22.95

Warehouse Mutants—
16K Tape $18.95 Disk $21.95

Buzzard Bait—
32K Tape $19.95 Disk $22.95

NOVASOFT
A Tom Mix Company
4285 Bradford N.E.
Grand Rapids, MI 49506

Ordering Information

- Add $3 shipping/handling
- MI residents add 4% sales tax
- Dealers welcome
- Many more titles—write for free catalog!

Credit Card Orders

Call 616/957-0444

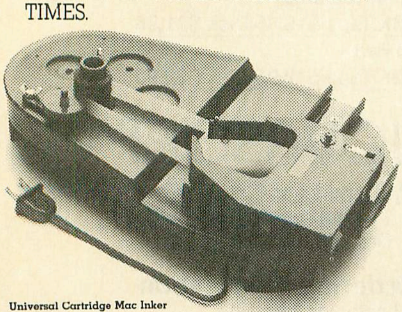
MasterCard VISA®

The Universal MacInker(s)(TM) are here

Re-ink any Fabric ribbon automatically for less than

5¢

Now one **Universal Cartridge MacInker (UC)** re-inks all fabric cartridges and one **Universal Spool MacInker (US)** re-inks all spools. We have **MacInker(s)** dedicated to specialized cartridges, zip pack, harmonica etc. Over 1000 printer brands supported. Use your **MacInker** to re-ink your dry, fabric cartridges (for less than 5 cents in ink) and watch the improvement in print-out quality. Our new, residue-less, lubricated, dot matrix ink yields a darker print than most new ribbons. Or get any of our basic ink colors: brown, blue, red, green, yellow, purple and use **MacInker** to **create and/or Re-ink your own colored cartridges.** We have uninked or colored cartridges for the popular printers and ribbon re-loads for any printer. Operation is extremely simple & automatic with new, twin drive electric motor that supports CW and CCW rotating cartridges. A good quality fabric ribbon of average length can be re-inked almost indefinitely. In our tests one re-inked Epson* 80 ribbon has outlived the estimated life of the print-head!! We receive consistent & similar feedback from our customers. As of August 85 we have over 40,000 MAC INKER(s) in the field, in 5 continents (220 V motors available). **MacInker (UC) is $60.00.** Cartridge drivers are **$8.50/ea.** We still have our first generation, dedicated **MacInker(s)** for most popular printers. Prices start at **$54.95** with most units below $60.00. **MacInker** has been reviewed, approved and flattered in most magazines and even in the NEW YORK TIMES and the CHICAGO SUN TIMES.



Universal Cartridge Mac Inker

Computer Friends

6415 S.W. Canyon Ct.
Portland, OR 97221
(503) 297-2321

Order toll free 1-800-547-3303
or ask for free detailed brochure.
Dealers inquiries welcome.

*EPSON is a trademark of EPSON CORP.

BUILDING JUNE'S RAINBOW

Welcome to CoCo Country

Recently, we were calling people throughout the building to come hear some movin', groovin' CoCo musical arrangements. I taunted the managing editors of our sister publications with, "Let's see your machine match that!" Rock 'n' Roll!

Truly, I had not realized any computer could jam that way — I'm talking driving-beat, get-down sound. CoCo's musical state of the art is a long way from PLAY statement Chopsticks. Unfortunately, for several selections, the "listing" (if one even existed) would run many magazine pages and would be helpful only to those who happen to have a given CoCo composer program.

Luckily, we also have solid material that can be shared. But, since these arrangements are all quite long, what we have done is run enough of the program code in the magazine to play the first few bars, to show you how it's done, and then included the entire file on RAINBOW ON TAPE. We don't like to put anything on RAINBOW ON TAPE that isn't in the magazine, but we believe you'll understand and forgive us this slight transgression, since doing otherwise would deprive you of some great stuff.

Carrying our departure from the norm a bit further, we also included some non-CoCo-generated music on this month's RAINBOW ON TAPE. We think that "Shadow of the Rings" by Becky and Dave Matthews is quite well done and, since it is their own original work, we have reproduced it on our tape service to go along with the graphics they also created. A quite intriguing, off-the-wall, multi-media work, I think you'll agree.

So, music takes many forms with the CoCo. One area that seems to be overlooked, however, is music about the CoCo! I mean, why not? I have an entire record album of C.B. radio songs that are so hokey I consider them classics. And, every time our Music and Sound issue of THE RAINBOW rolls around, I chide myself for not having written at least one tongue-in-cheek, just-for-fun CoCo song.

You see, I do have some songwriting credentials — however shaky or suspect they may be. A decade ago, former RAINBOW senior editor Courtney W. Noe and I put our middle names together and the country music team of Willard and Earl was born. Out of that concerted, two-week venture came "Come on Over for a Pick-Me-Up, My Woman Just Put Me Down" and the ever-popular "They Got Tums for the Tummy, and Contact for Your Cold, But There Ain't No Pain Reliever for the Soul," plus some lesser-known hits.

My creative inspirations always lean toward that lyin', dyin', cheatin', cryin' life-in-the-emergency-lane music. And, the way we carry on about our CoCo, it's time we set our words to music. How about "Ballad of the CoCo Widow," or "I'm Proud to be a CoCo-Loco's Daughter," huh, huh? Let's see, "The Keyboard Bounce Blues"? Maybe not. Or, "Send Me the EPROM You Just Burned In." Whew, baby. Heavy stuff, eh! Here's a bound for glory classic, for sure: "I Dreamed I Was There in Hardware Hacker Heaven."

No, this isn't a contest. But, if you send in a goody, and Lonnie's out of town a few days, it just might get printed. Heck, send us just the title if you want; if it brings a chuckle, or twangs the old heart strings, we'll share it with the CoCo World. No reason it has to be country, but don't count on getting into the Tom T. Hall of Fame with some punk rock stuff!

Yee-Hah! I'm on a roll now, "These Boots Are Made for DOSes," or "I've Forgotten More Than You'll Ever Know About C." Look out Nashville! "You Gotta Walk That Silicon Valley" sounds Top 40 to me. How about "Does RFI Sometimes Waver Through the Bedposts Late at Night?" Or, "I'm Proud to be a CoCo-ee from Muskogee." Or . . .

Ending with my usual refrain: To keep up with the beat and in tune with the times, I invite you to join with those who subscribe to THE RAINBOW (Use our new *orders only* toll free number: 800-847-0309). We celebrate our fifth anniversary next month — We were CoCo when CoCo wasn't Cool!

— Jim Reed

Have you yet subscribed to

COCO TIME

A monthly magazine on tape and disk

Now every month you can get 8-10 ready-to-run utilities, programming tips & hints, business applications, home management, tutorials, and educational programs. Also a Buy 'N Sell section and much, much more. NO GAMES, ONLY REAL STUFF!

Each issue shipped to you by first-class mail.

Programs written by computer wizards like Kishore M. Santwani and Gary T. Jes.

SUBSCRIBER BENEFITS

- Free advice/help on your Basic and ML programs, whenever possible.
- Free Buy 'N Sell ads on computers and software
- 10% off on all Microcom software/books
- Subscribers encouraged to submit programs for inclusion. (Contact us.)

EVERY YEAR YOU GET OVER $1500 WORTH OF SOFTWARE.
So Act Now!

DECEMBER 1985

- 40K BASIC (For 64K Cassette Users)
- Super INPUT/LINE INPUT
- Tape-to-Tape Copy (Basic and ML)
- Mailing List (Disk Only; Many Functions)
- Banner Maker (7" Letters/Numbers)
- Single Page LIST/DIR
- Alpha Directory
- Disk Tutorial (Part 1 of 10 part series)
- Spell 'n Win Series 1 (400 words/4 levels)

The market value of these programs is OVER $150, DOUBLE the price of our annual subscription.

Subscription Rates (USA & Canada)

	Tape	Disk
1 Year	$65	$75
6 Months	$40	$50
Single	$10	$15

(Other countries add 25%)
Pay by VISA/MC/Check/MO

THOUSANDS OF PROGRAMMERS USE THESE UTILITIES DAILY. SHOULDN'T YOU?

UTILITY ROUTINES for the TANDY & TRS-80 COLOR COMPUTER (Vol. 1)

This powerful book for Basic and ML Programmers, includes program explanation, memory requirements, and an annotated source listing for the utility routines given below. These routines if bought individually will cost you HUNDREDS OF DOLLARS.

These are 100% Position Independent ML Utilities and require no ML programming knowledge.

COMMAND KEYS: Access most Basic commands with 2 keystrokes.
CURSOR STYLES: Create OVER 65000 Cursor Styles.
FULL LENGTH ERRORS: Get full length error messages.
KEY CLICKER: Ensure key input accuracy.
PAUSE CONTROL: Put Basic/most ML programs "on hold."
REPEAT KEY: Repeat ANY key. 5 different key speeds.
REVERSE VIDEO (Green and Red): Eliminate eye strain.
SPOOLER (16K, 32K, 64K): Don't wait for those printouts, 32K Spooling Butter in 64K.
SUPER SCROLLER (64K Only): Save and examine everything that scrolls off the text screen.
AND MUCH, MUCH MORE!

Compatible with 16K/32K/64K ECB/Cassette and Disk Systems and CoCo I and CoCo II.

BOOK $19.95
THESE ROUTINES (READY-TO-RUN) ON CASSETTE/DISK: $24.95
BOTH BOOK & CASSETTE/DISK: $36.95

BEST OF COCO TIME '85

(UTILITIES)

18 best selected utilities from COCO-TIME 1985 like: In Memory Disk Drive for 64K Cassette Users, CoCo Disk Zap, Basic Program Packer, Tape Encryption (Basic), Disk Encryption (Basic), Graphics Screen Dump for DMP Printers, Basic Search, EZ Disk Master, Function Keys, Graphics Zoom, Tape Index System, 40K Basic (for 64K Cassette Users), Alpha Directory, Banner Creator, LIST/DIR Pause, Disk Mailing List, Super INPUT/LINE INPUT, and Tape-to-Tape Copy.

Disk or Cassette, Only For $26.95

DISK ANTI-PIRATE $59.95
HIDE-A-BASIC 1.1 $24.95
BOTH $79.95

500 POKES, PEEKS 'N EXECS for the TRS-80 COLOR COMPUTER

NEVER BEFORE has this information of vital significance to a programmer been so readily available to everyone. This book will help you 'GET UNDERNEATH THE COVER' of the color Computer and develop your own HI-QUALITY programs, SO WHY WAIT?

This book includes POKEs, PEEKs, and EXECs to:

- Auto start our Basic programs.
- Disables most Color Basic/ECB/Disk Basic commands.
- Disable BREAK KEY, CLEAR KEY and RESET BUTTON.
- Generate a Repeat-Key.
- Merge two Basic programs.
- Transfer Rompaks to tape (for 64K only).
- Speed up your programs.
- RESET, MOTOR ON/OFF from keyboard.
- Restart your Basic program thru the RESET BUTTON.
- Produce Key-Clicks and Error-Beeps.
- Recover Basic progams lost by NEW, ?10 ERRORS and faulty RESET.
- Set 23 different GRAPHIC/SEMIGRAPHIC modes.
- Set 15 of the most commonly used Baud Rates.
- Allow you more plays in 23 of your favorite arcade games.
- AND MUCH, MUCH MORE!

COMMANDS COMPATIBLE WITH 16K/32K/64K COLOR BASIC/ECB/DISK BASIC SYSTEMS and CoCoI and CoCoII.

ONLY $16.95

Basic Programming Tricks Revealed	**$14.95**
Color Basic Unravelled	**$19.95**
Extended Basic Unravelled	**$19.95**
Disk Basic Unravelled	**$19.95**
All 3 Unravelled Books	**$49.95**
FACTS	**$14.95**

Telewriter-64. (Cas)	**49.95**
(DSK)	**59.95**
TELEPATCH	**19.95**
CoCo Max	**69.95**
COCO MAX II	**79.95**
Y CABLE FOR COCO MAX	**27.95**
PRO-COLOR-FILE 2.0	**59.95**
DYNACALC	**89.95**
AUTOTERM (CAS)	**39.95**
(DSK)	**49.95**
THE COMPLETE RAINBOW GUIDE TO OS-9 (book only)	**18.95**
RAINBOW GUIDE TO OS-9 DISK PACKAGE (2 disks)	**29.00**

MICROCOM SOFTWARE
P.O. Box 214
Fairport, N.Y. 14450
Phone (716) 223-1477

Our software/books are available at all leading dealers in USA & Canada. To Order: **Order by phone & get a $2 refund for your phone call.** VISA, MC, Check, MO. Please add $3.00 shipping and handling (USA & CANADA, other countries $5.00). COD add $2.50 extra. NYS residents please add Sales Tax. Call for discounts on bulk quantities. Dealer inquiries invited.

MasterCard
VISA
Cards Welcome

24-HOUR ORDER HOT LINE (7 DAYS A WEEK): (716) 223-1477

16K
ECB

Nothing Phone-y about It: Ma Bell Trips the Light Fantastic

By Becky F. Matthews

Welcome to CCTV (CoCo TV)! Before loading this program type `PCLEAR 8` (to free two Hi-Res graphics screens), then load *OnHold*, run it, and feel free to sing along. This is a simple animation program with telephones dancing to music, but the results are quite entertaining. The speed-up `POKE` is used in Line 10, so be sure to delete it if your computer won't handle it. There are two kinds of music statements and two kinds of animation used in *OnHold*.

Lines 55-85 use the text screen to print the words to the song chorus and sound the appropriate note for each word.

Lines 90-190 draw one telephone on Hi-Res graphics screen `PMODE 4,1`. `GET` it and use `PUT` to "stamp" seven more phones on the screen. Lines 125-135 paint the phones. Line 145 copies the phones to the second graphics screen, `PMODE 4,5`. Line 160 draws straight legs on the `PMODE 4,5` phones. Lines 170-180 draw legs in various dance positions on the `PMODE 4,1` phones.

Lines 195-250 comprise the "slow dance" routine. This routine is performed four times (Variable P in Line 200). Using `GET`, a phone is chosen randomly from the `PMODE 4,1` screen (lines 200-205) and is "stamped" using `PUT` (Line 225) to each phone position in `PMODE 4,5`. Each time this routine takes place, 'Y' is decremented by two (Line 210). This moves the rows of telephones higher on the screen. When 'Y' is less than 33, the screen is cleared with Color C (Line 215) and the next phones return to their original screen position (Y = 40). Line 230 sets 'Y' up to `PUT` the bottom row of phones. Line 235 sets 'Y' back to the top row of phones.

Lines 255-265 make up the "fast dance" routine, which simply flips between `PMODE 4,1` and `PMODE 4,5`. To change the speed of the fast dance, change the value of 'T' in the two timing loops in Line 260. Variable S tells how many times the pages are flipped. Subroutine 270 (lines 270-280) makes a telephone ring sound effect.

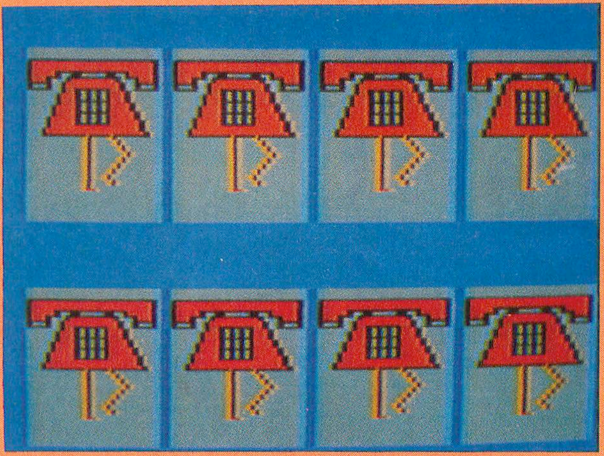
Line 50 causes the dance sequence to start again (`GOTO 30`), so use BREAK to stop the program when you've seen enough dancing telephones. Don't forget to type `POKE 65494,0` when you're done to slow the CoCo back to normal speed.

(Direct questions about this program to the author at 2415 Smith Springs Road, Nashville, TN 37217. Please enclose an SASE for a reply.) ☐

Becky Matthews and her husband, David, live in Nashville, Tennessee, and do free-lance work in electronics, computers and music.

The listing: ONHOLD

```
5 '***"ONHOLD" BY B. MATTHEWS -
SONG "DON'T PUT ME ON HOLD" COPY
RIGHT 1985 B. & D. MATTHEWS
10 POKE65495,0 '*SPEED-UP POKE
15 DIMW(87)
20 GOSUB55 '*SONG CHORUS
25 GOSUB90 '*DRAW PHONES
30 GOSUB255 '*FAST DANCE
35 GOSUB270 '*PHONE RING
40 GOSUB195 '*SLOW DANCE
45 GOSUB55 '*CHORUS
50 GOTO30 '*START ROUTINE AGAIN
55 '***SONG CHORUS SUB
60 CLS4:PRINT @ 105,"DON'T";:SOU
```



```
ND 108,4:PRINT @ 305,"   ";:PRIN
T @ 175,"PUT";:SOUND 133,2:PRINT
 @ 235,"ME";
65 SOUND 133,2:PRINT @ 305,"ON";
:SOUND 147,4:PRINT @ 362,"HOLD!"
;:SOUND 32,4
70 CLS8:PRINT @ 100,"DON'T";:SOU
ND 147,4:PRINT @ 172,"PUT";:SOUN
D 147,2:PRINT @241,"ME";:SOUND 1
47,2:PRINT @ 308,"ON";:SOUND 133
,4:PRINT @ 375,"HOLD!";:SOUND 14
7,4
75 CLS3:PRINT @ 104,"AND";:SOUND
 108,4:PRINT @ 143,"DON'T";:SOUN
D 133,4:PRINT @ 235,"HANG";:SOUN
D 147,4:PRINT @ 305,"UP!";:SOUND
 32,4:FORT=1TO210:NEXTT
80 CLS4:PRINT @ 106,"DON'T";:SOU
ND 147,4:FORT=1TO290:NEXTT:PRINT
 @ 205,"HANG";:SOUND 133,4:PRINT
 @ 305,"UP!";:SOUND 108,4
85 RETURN
90 '***DRAW PHONES SUB
95 PMODE4,1:PCLS1:SCREEN1,1:PMOD
E3
100 DRAW"BM20,70C1S8NR20M+5,-10R
1U1R1D1R6U1R1D1R1NM+6,+10BU1R2D1
R2D2R4U1NL4U4L26D4NR4D1R4U2R2U1R
4NR6BD3NR6D2NR6D2NR6D2R2NU6R2NU6
R2NU6"
105 '*"STAMP" PHONES USING GET/P
UT
110 GET(15,40)-(70,70),W,G
115 FORY=40TO125STEP85:FORX=15TO
195STEP60:PUT(X,Y)-(X+55,Y+30),W
,PSET:NEXTX:NEXTY
120 '*PAINT PHONES
125 FORY=47TO132STEP85
130 PAINT(30,Y+18),2,1:PAINT(30,
Y),2,1:PAINT(90,Y+18),3,1:PAINT(
100,Y),3,1:PAINT(150,Y+18),2,1:P
AINT(150,Y),2,1:PAINT(210,Y+18),
3,1:PAINT(210,Y),3,1
135 NEXTY
140 '*COPY PHONES TO PMODE4,5
145 FORP=1TO4:PCOPYP TO P+4:NEXT
P
150 PMODE4,5:SCREEN1,1:PMODE3,5
155 '*DRAW STRAIGHT LEGS
160 DRAW"C2BM36,70D10L1BR8L1U10B
R23C3D10L1BR8L1U10BR25C2D10L1BR8
L1U10BR23C3D10L1BR8L1U10BD43D10R
1BL7NL1U10C2BL23D10NR1BL7R1U10BL
25C3D10NR1BL7R1U10BL23C2D10NR1BL
7R1U10"
165 '*DRAW "CRAZY" LEGS
170 PMODE4,1:SCREEN1,1:PMODE3,1
175 DRAW"C2BM36,70G8H1BD3BR14R1N
U10C3BR24L1U10BR6F8E1C2BR8F1E8BR
4F8E1C3BR16BD3L1U10BR5F6L6D1"
180 DRAW"C2BM37,156G4F4G1BR4R1NU
10C3BR28L1U10BR4F4G4F1C2BR25E1H4
E4BR2F4G4F1BR24BU8C3G6R6D1BR5BD3
R1U10"
185 C=2:Y=40
190 RETURN
195 '***SLOW DANCE SUB
200 FOR P=1TO4:PMODE4,1:R=RND(2)
-1:H=40+(R*85):S=RND(3):X=13+(60
*S)
205 GET(X,H)-(X+56,H+60),W,G
210 Y=Y-2
215 IFY<33THENY=40:PMODE4,5:SCRE
EN1,1:PMODE3,5:PCLSC:C=C+1:IFC>8
THENC=2
220 PMODE4,5:SCREEN1,1
225 FORX=13TO220STEP60:SOUND 226
,1:PUT(X,Y)-(X+56,Y+60),W,PSET:N
EXTX
230 IFY<=40THENY=Y+85:GOTO220
235 Y=Y-85
240 NEXTP
245 FORT=1TO1000:NEXTT
250 RETURN
255 '***FAST DANCE SUB
260 FOR S=1TO18:PMODE4,1:SCREEN1
,1:SOUND 235,1:FORT=1TO150:NEXTT
:PMODE4,5:SCREEN1,1:SOUND 237,1:
FORT=1TO150:NEXTT:NEXT S
265 RETURN
270 '***PHONE RING SUB
275 FORR=1TO2:FORX=1TO4:PLAY"T25
5V31A1P1B1P1A1P1B1P1A1P1B1":FORT
=1TO70:NEXTT:NEXTX:FORT=1TO250:N
EXTT:NEXTR
280 RETURN
```

This program sets the songwriter's stage by providing blank sheet music — you just fill in the notes . . .

The Music Maker's Accompanist

By Barry McNeice

Music Paper uses the dot-addressable mode to print blank sheet music with the DMP-105 printer.

Data statements for poking the title screen are tucked away at the end of the program. Line 30 reads past the main body of data, so the title screen POKEs are read only once.

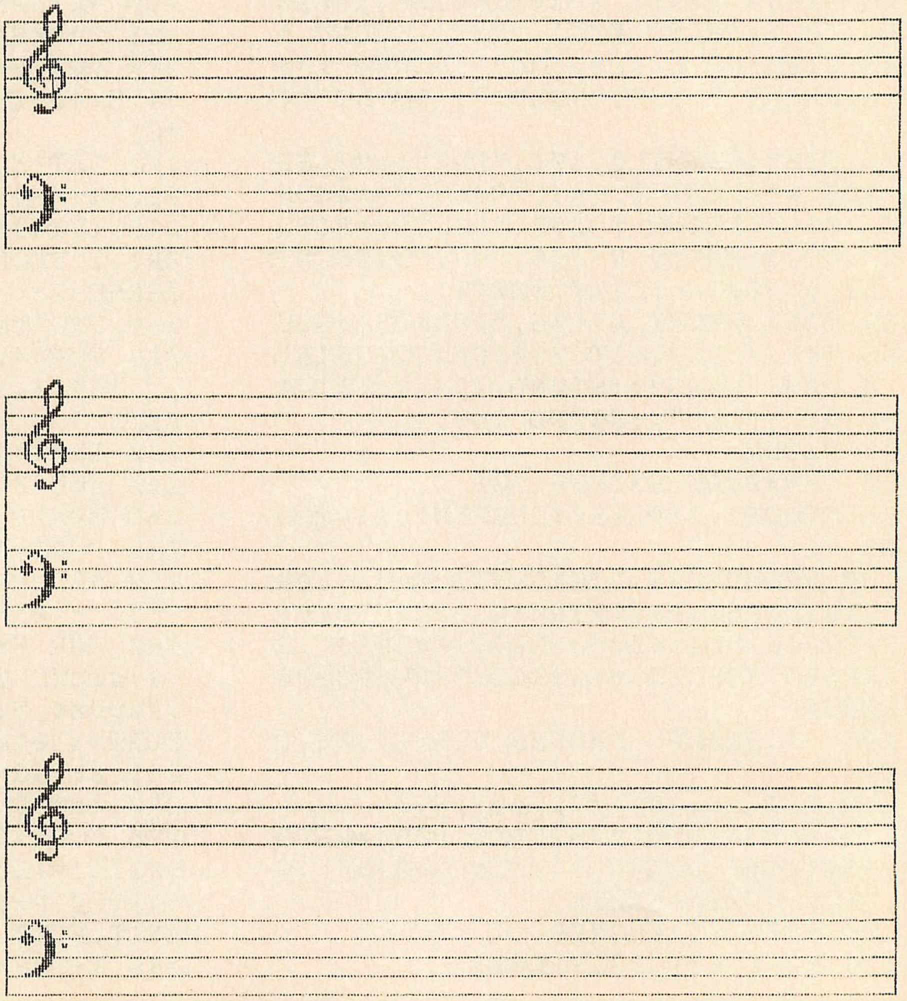
Line 70 checks to make sure the printer is ready. I got this helpful hint from Justin Snyder in the December 1984 RAINBOW letters section. The routine for "freehand drawing" in lines 150 through 230 was taken directly from the DMP-105 owner's manual.

Each page holds five lines of music with bass and treble clefs. There should be plenty of room between lines for lyrics to your song. I hope this program helps make song writing just a little easier.

(You may direct questions about this program to the author at P.O. Box 1248, Yakima, WA 98907, phone 509-457-8865 from 8 a.m. to 5 p.m. PST. Please enclose an SASE when writing.) ☐

Barry McNeice lives in Yakima, Washington, and is employed as a rubber stamp maker. A novice programmer, his hobbies include music and the CoCo. He is involved with the Yakima CoCo Special Interest Group.

Sample Printout



Introducing

CoCo Max™ II

> There is absolutely nothing else on the Color Computer that is comparable to CoCo Max's power and ease of use. The most enjoyable time with a computer I ever had.
> ***- Computerware Review May 1985***

> CoCo Max is the most incredible product ever marketed for the CC. No review can do it justice. I've never given any product a 10...I give Colorware's CoCo Max (Hardware, Software and Documentation) a 10!
> ***- Color Chronicle Vol III #6***

> I never expected to see anything like it on my CoCo screen. There isn't a single command to remember. Even a person who has no drawing ability like myself can create a presentable picture. I've spent hours just doodling enjoying all the things from silly to the serious. Fascinating experience. Buy it, you won't be sorry.
> ***- 6809 Express May 1985***

> An outstanding program that almost turns your CoCo into a replica of the Macintosh. Terrific hi-res color, very easy to learn and use.
> ***- Family Computing February 1986***

> CoCo Max puts fun back into computing, offering a state of the art environment you find on much more expensive machines. Colorware has invested the kind of time and research that virtually secures its success, and that shows up on your screen.
> ***- Hot CoCo July 1985***

> The pack is well constructed, the user's manual is complete with illustrations and well organized. An outstanding buy for the performance. Colorware's advertisement accurately describes the product. Their delivery was timely as promised.
> ***-Rainbow June 1985***

These were reviews of CoCo Max I. CoCo Max II will blow your socks off with even more power!

- New bidirectional shrink and stretch
- New rotate function
- 9 new fonts (for over 200 typestyles)
- A new "Glyphic font" of small pictures
- A 68 page scrapbook
- Point and click to load files (no typing)
- Full error reporting, crash proof
- Custom patterns can be saved
- Printing in color (with CGP 115 or 220)
- Much more. (Note: CoCo Max II is available on disk only)

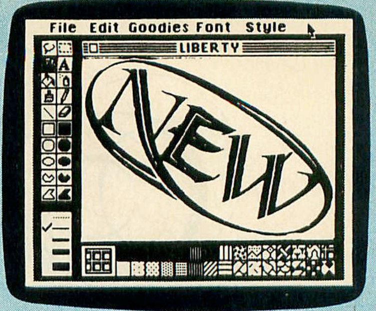
The reviews are nice, but see it for yourself* and draw your own conclusion.

*If you are not delighted with your CoCo Max II, we will immediately refund your purchase, including postage back.

COLORWARE Call Toll Free 800-221-0916.

For more information on CoCo Max, turn the page.

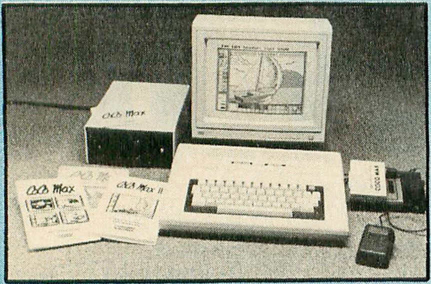
CoCo Max™ II



You'll use it all the time and love using it.

What is CoCo Max ?

Simply the most incredible graphic and text creation "system" you have ever seen. A Hi-Res Input Pack (more on the pack later) is combined with high speed machine language software. The result will dazzle you.



CoCo Max disk system, with Y-cable.

Is CoCo Max for you ?

Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

What made CoCo Max an instant success ?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply ***pointing*** and ***clicking*** with your mouse or joystick. With ***icons*** and ***pull down menus,*** you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen. It's so friendly that you will easily recover from mistakes: The ***undo*** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

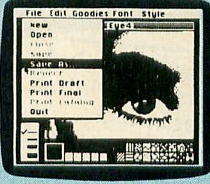
With the ***pencil*** you can draw free hand lines, then use the ***eraser*** to make corrections or changes. For straight lines, the convenient ***rubber-banding*** lets you preview your lines before they are fixed on your picture. It's fun and accurate. Lines can be of any width and made of any color or texture.

The ***paint brush,*** with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple.

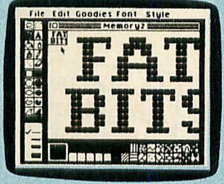
For special effects, the ***spray can*** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The ***Glyphics*** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



Pull down menus



Zoom In !

Control Over Your Work

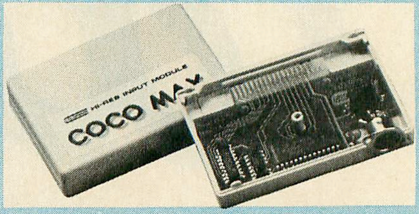
CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats: • You can move it around • Copy it • Shrink or enlarge it in both directions • Save it on the electronic ***Clipbook*** • Flip it vertically or horizontally • Rotate it • Invert it • Clear it, etc. etc.

All this is done instantly, and you can always ***undo*** it if you don't like the results.

For detail work, the ***fat bits*** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color !

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max's magic on any standard binary image file. There are also many advanced features such as the incredible ***lasso***.



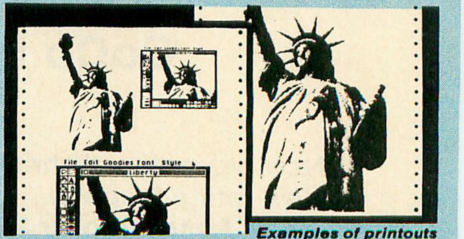
Inside the Hi-Res Input Pack

Why a Hi-Res Input Pack ?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in ***fonts*** each with 16 variations. That's over 200 typestyles !


File Edit Goodies Font Style
Liberty

Examples of printouts

Printing Your Creations

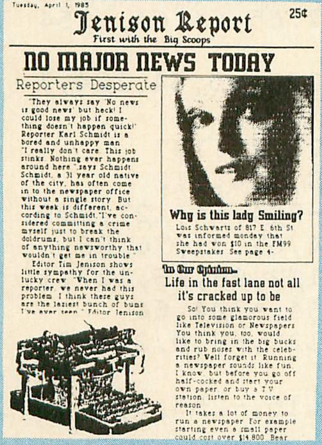
There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers !

All the CoCo Max pictures are **unretouched** screen shots or printouts (Epson RX-80).

CoCo Max II™

The whole family will enjoy CoCo Max. Here are a few examples of the possibilities.

All these pictures are **unretouched** screen photos or printouts (on an Epson RX-80).



Tuesday, April 1, 1985 — 25¢

Jenison Report

First with the Big Scoops

NO MAJOR NEWS TODAY

Reporters Desperate

"They always say 'No news is good news' but heck! I could lose my job if something doesn't happen quick!" Reporter Karl Schmidt is a bored and unhappy man. "I really don't care. This job stinks. Nothing ever happens around here," says Schmidt. Schmidt, a 31 year old native of the city, has often come in to the newspaper office without a single story. But this week is different, according to Schmidt. "I've considered committing a crime myself just to break the doldrums, but I can't think of anything newsworthy that wouldn't get me in trouble."

Editor Tim Jenison shows little sympathy for the unlucky crew. "When I was a reporter, we never had this problem. I think these guys are the laziest bunch of bums I've ever seen." Editor Jenison

Why is this lady Smiling?

Lois Schwartz of 817 E. 6th St was informed monday that she had won $10 in the FM99 Sweepstakes. See page 4-

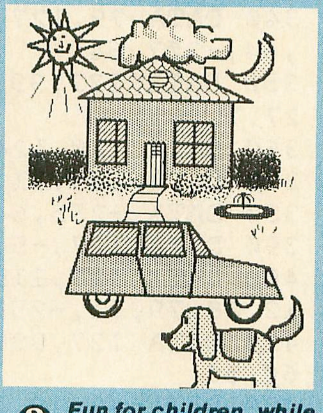
In Our Opinion...

Life in the fast lane not all it's cracked up to be

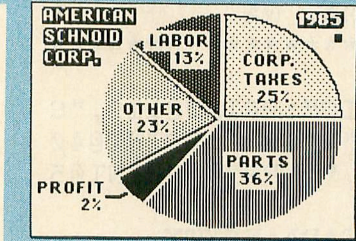
So! You think you want to go into some glamorous field like Television or Newspapers. You think you, too, would like to bring in the big bucks and rub noses with the celebrities? Well forget it. Running a newspaper sounds like fun, I know, but before you go off half-cocked and start your own paper, or buy a T.V. station, listen to the voice of reason.

It takes a lot of money to run a newspaper. For example starting even a small paper could cost over $14,800. Bear

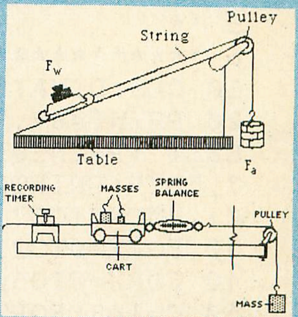
❶ *Publish a newsletter or bulletin*



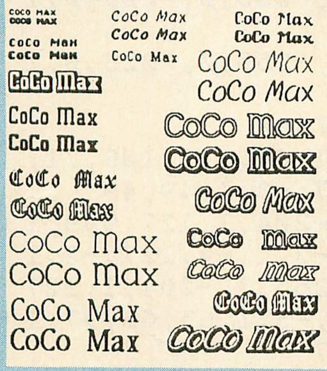
❷ *Fun for children while stimulating creativity.*



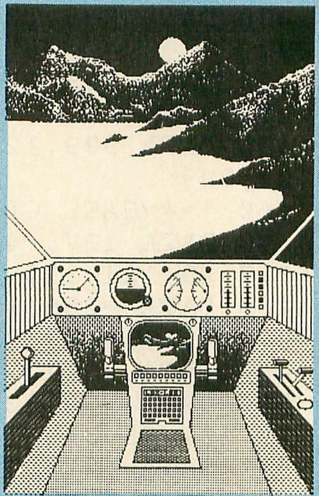
❸ *Business graphs, charts, diagrams. Also memos*



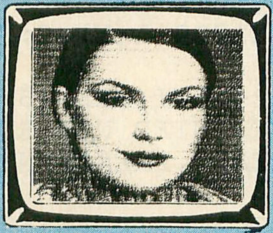
❹ *Junior's homework and science projects. Term papers too!*



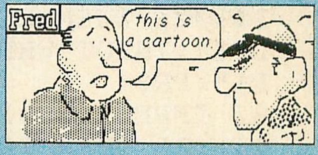
❺ *Over 200 typestyles to choose from! generate flyers.*



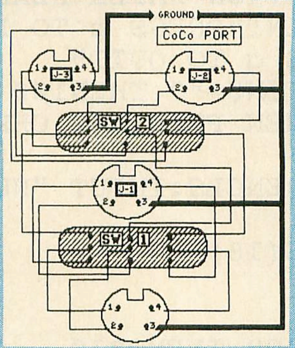
❻ *A new way to express your imagination.*



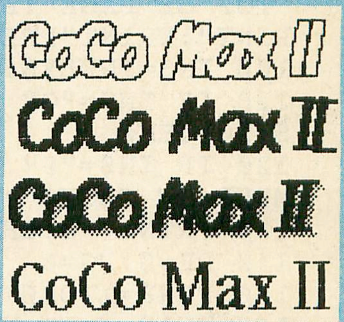
❼ *Video portrait (with optional digitizer).*



❽ *This is a cartoon.*



❾ *schematics and floor plans.*



❿ *Logos and letterheads.*

System Requirements:

Any 64K CoCo and a standard joystick or mouse. (The koala pad and the track ball work, but are not recommended.)
Disk systems need a Multi-Pak or our Y-Cable.
CoCo Max is compatible with any Radio Shack DOS and ADOS.
Note: the tape version of CoCo Max includes almost all the features of CoCo Max II except *Shrink, Stretch, Rotate,* and *Glyphics*. Also, it has 5 fonts instead of 14.
CoCo Max is not compatible with JDOS, DoubleDOS, MDOS, OS-9, the X-pad, and Daisy Wheel Printers.

Printers Supported:

Epson MX, RX, FX and LX series, Gemini, Star, Micronix, Delta 10, 10X, 15, 15X, SG-10, Okidata 82A, 92, 93, C. Itoh Pro-writer, Apple Image-writer, Hewlett-Packard Thinkjet, Radio Shack DMP 100, 105, 110, 120, 200, 400, 500, Line Printer 7, Line Printer 8, TRP-100, CGP-220. (DMP-130 use Line Printer 8), PMC printers, Gorilla Banana.
Color printing: CGP-200, CGP-115

Pricing

CoCo Max on tape $69.95
with Hi-Res Pack and manual.
CoCo Max II (disk only).......... $79.95
with Hi-Res Pack and manual.
Upgrade: CoCo Max to CoCo Max II
New disk and manual...................... $19.95
New features of CoCo Max II: 14 fonts and glyphic font, dynamic shrink and stretch, rotate, multiple drive capability, 68 page scrapbook, point and click file load, color printer drivers, full error reporting.
Upgrade: CoCo Max tape to disk
manuals, disk and binder.................. $24.95
Y-Cable: *Special Price*........... $19.95
Super Picture Disks #1, #2, and #3
each: $14.95
All three picture disks $29.95

Guaranteed Satisfaction
Use CoCo Max for a full month.
If you are not delighted with it,
we will refund every penny.

Font Editor Option

A font is a set of characters of a particular style. CoCo Max includes 15 fonts. You can create new fonts of letters, or even symbols or graphics with the font editor. Examples: set of symbols for electronics, foreign alphabets, etc. $19.95

Video Digitizer DS-69

This new Low Cost Digitizer is the next step in sophistication for your CoCo Max system. With the DS-69 you will be able to digitize and bring into CoCo Max a frame from any video source: VCR, tuner, or video camera. Comes complete with detailed manual and C-SEE software on disk. Multi-Pak is required.
New Low Price Save $50......... $99.95
New: faster DS-69A.......... $149.95

COLORWARE

Colorware Incorporated
79-04A Jamaica Avenue
Woodhaven, NY 11421

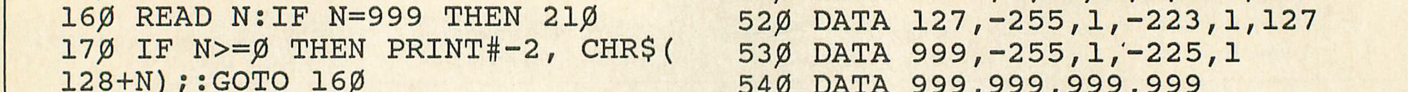
800 221-0916
Orders only.
NY & Info: (718) 296-5916
Hours: 9-5 Eastern time.

Add $3.00 per order for shipping.
We accept Visa, MC, checks, M.O.
C.O.D. add $3.00 extra.
NY and CT : add sales tax.
Shipping to Canada is $5.00
Overseas, FPO, APO add 10%

VISA

The listing: MUSPAPER

```
1 '*****************************
2 '*     MUSIC SHEET PAPER     *
3 '*      FOR THE DMP 105      *
4 '*     BY BARRY MCNEICE      *
5 '*        YAKIMA, WA         *
6 '*****************************
10 CLS:DIMA(51)
20 PRINT@87,"MUSIC":PRINT@119,"S
HEET":PRINT@151,"PAPER":PRINT@40
7,"BY":PRINT@470,"BARRY":PRINT@5
01,"MCNEICE"
30 FORX=0TO214:READA:NEXTX
40 FORX=0TO50:READB:A(X)=B:NEXTX
50 C=143:FORT=0TO6:C=C+16
60 FORX=0TO50:POKE1023+A(X),C:NE
XTX,T:RESTORE:CLS
70 IFPEEK(65314)/2<>INT(PEEK(653
14)/2) THENPRINT"PRINTER NOT REA
DY!":INPUT"WHEN READY,PRESS(ENTE
R)";PR$
80 IFPEEK(65314)/2<>INT(PEEK(653
14)/2) THEN 70
90 CLS:PRINT"POSITION PAPER NEAR
 TOP OF PAGE":PRINT"PRESS p TO P
RINT":PRINT"PRESS q TO QUIT"
100 IN$=INKEY$:IFIN$="" THEN100
110 IF IN$="Q" THEN PRINT#-2,CHR
$(30):END
120 IF IN$="P" THENCLS:INPUT "NU
MBER OF PAGES";P
130 PRINT#-2,CHR$(18)
140 RE=0:PG=0
150 FORR=1TO20
160 READ N:IF N=999 THEN 210
170 IF N>=0 THEN PRINT#-2, CHR$(
128+N);:GOTO 160
180 READM
190 PRINT#-2,CHR$(28);CHR$(-N);C
HR$(128+M);
200 GOTO160
210 PRINT#-2:NEXTR
220 RESTORE:RE=RE+1:IF RE=5 THEN
GOSUB240
230 GOTO 150
240 REP=0:PG=PG+1
250 FOR SP=1TO13:PRINT#-2:NEXTSP
260 IF PG=P THEN PRINT#-2,CHR$(3
0):GOTO70
270 RETURN
280 '***TREBLE CLEF***
290 DATA 999,-12,64,120,124
300 DATA 78,71,67,127,124
310 DATA -255,64,-206,64,999,127
320 DATA -11,64,71,127,96,112,12
0,95,71,-255,64,-205,64,127,999
330 DATA 127,-7,64,96,120,124,94
340 DATA 79,127,67,65,64,64,-254
,64,-207,64
350 DATA 127,999,127,-5,64,124,1
27,71,65
360 DATA 120,124,78,71,127
370 DATA 103,71,78,124,112
380 DATA -255,64,-204,64,127,999
390 DATA 127,-5,64,67,71,76,88
400 DATA 113,115,102,96,96,127,1
12,88,79,71,-255,64,-204,64
410 DATA 127,999,127,-8,0,24,60,
60,56
420 DATA 48,48,24,15,-255,0,-207
,0,127
430 DATA 999,127,-255,0,-223,0,1
27
440 DATA 999,127,-255,0,-223,0,1
27
450 DATA 999,127,-255,0,-223,0,1
27,999
460 '***BASS CLEF***
470 DATA 127,-4,1,65,113,109,71,
3,7,29,121,113,97,-3,1,49,49
480 DATA -255,1,-204,1,127,999,1
27,-4,1,3,7,7,3,-3,1,-4,127,-2,1
490 DATA 13,13,-255,1,-204,1,127
500 DATA 999,127,-5,1,65,65,97,1
13,121,63,31,15,7
510 DATA -255,1,-209,1,127,999
520 DATA 127,-255,1,-223,1,127
530 DATA 999,-255,1,-225,1
540 DATA 999,999,999,999
550 DATA 999,999,999,999
560 '****TITLE SCREEN POKES****
570 DATA 16,17,47,50
580 DATA 79,82,111,113,142,143,1
44
590 DATA 172,173,175
600 DATA 203,207,234,238,239,240
,241,242
610 DATA 266,269,270,272,275,276
620 DATA 298,301,304,308
630 DATA 330,331,334,336,340
640 DATA 364,368,371
650 DATA 397,398,399,400,401,402
660 DATA 433,463,465
670 DATA 495,496,497
```



Why do more CoCo owners choose 'REAL TALKER'?

Sure it's priced right, but there's more...

Thousands of 'Real Talker' owners know 'Real Talker' beats ALL other Coco voice synthesizers in ease of use and flexibility. And, NO other Coco talker has a clearer, more intelligible voice. That's quite a lot of advantage when you consider Real Talker's unbeatable price. Yet, Real Talker has some important features that you simply will not find in other Coco talkers:

'Real Talker' is compatible with any 16K, 32K, 64K Extended or non-extended Color Computer. It works with any cassette or disk system and comes complete and ready to talk through your T.V. or monitor speaker. Price includes the 'Real Talker' electronic voice synthesizer in a ROM pack, software on cassette (may be transferred to disk), and user manual.

'SAY' command - You'll have your computer talking brilliantly in just minutes thanks to this powerful new command. Type SAY "ANYTHING YOU WANT" and your words are instantly spoken. It's that simple. Think how easy this makes creating speaking Basic programs. Adding speech to your existing programs is a snap too.

'CONVERT' - This is a truly powerful command for the basic programer. CONVERT automatically transforms a machine language dependent speaking program into a stand-alone Basic program. In other words, you can effortlessly write speaking Basic programs that do not require a machine language translator in memory. This is a unique feature of 'Real Talker'. No other voice synthesizer gives you anything even remotely approaching this type of capability - even synthesizers costing considerably more.

COLORWARE
'REAL TALKER'
REAL TALKER
TEXT TO SPEECH
INSTRUCTION
'REAL TALK
HARDWARE VOI
SYNTHESIZER

'Real Talker' is a full-featured electronic voice synthesizer unit built into a compact cartridge case. You simply plug it into the side of your computer.

NOW INCLUDED WITH 'REAL TALKER'........

1. ***'DR. TALK***-This interactive "Eliza" type psychoanalyst program will discuss your innermost problems at length.

2. ***'TALKING BATTLESHIP'***-It's you vs. the computer in this speaking version of the classic game.

3. ***'TALKING BLACKJACK'***- Play for big stakes against a rather talkative casino dealer.

ONLY

59^{95}

Other features include software controlled pitch, unlimited vocabulary text-to-speech, and even a program that will recite any ASCII file (such as from Telewriter-64 & other word processors). You also get Colorware's unique full-screen phoneme editor program that let's you experiment with and modify speech at it's most fundimental level.

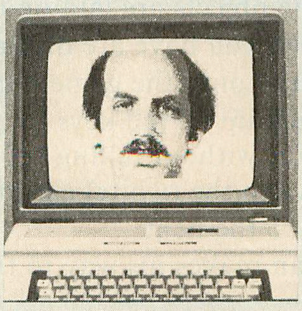
'REAL TALKER-1' (for the original Color Computer)..............*$59.95*

'REAL TALKER-2' (for the Color Computer-2).........................*$64.95*

'Y - BRANCHING CABLE' For disk systems. If you have a disk system but do not have a Radio Shack Multi-Slot unit, this economical cable will allow to connect and use your Real Talker and Disk system together...................................*27.95*

TALKHEAD

If you have a 'Real Talker', do not deprive yourself of this absolutely incredible machine-language Talking Head simulation program. While other talking head simulations use a minimal cartoon-like face, TALKHEAD uses high resolution, full-screen, digitized images of an actual person's face to create a life-like animated effect.



ACTUAL UNRETOUCHED PHOTO

SOFTWARE FOR THE 'REAL TALKER'

TALKHEAD can be easily commanded in Basic to appear on screen and say anything you want. Available on cassette or disk for only $19.95, TALKHEAD requires 64K and a Colorware 'Real Talker'.

ONLY $19.95

COLORWARE

COLORWARE INC
79-04A Jamaica Ave.
Woodhaven, NY 11421
(718) 296-5916

VISA
MasterCard

★★★ ORDERING INFORMATION ★★★

ADD $3.00 PER ORDER FOR SHIPPING AND HANDLING.
C.O.D.'S ADD $3.00 EXTRA.
SHIPPING AND HANDLING FOR CANADA IS $5.00
WE ACCEPT VISA, MASTER CARD, M.O.'S, CHECKS.
N.Y. RESIDENTS MUST ADD SALES TAX.

Who Will Survive

By Scott Halfman

You are traveling in a land far away, seeking fortune. You gain loot by passing from castle to castle, each time picking up all the objects on the different levels (floors) of the castle. After cleaning out each castle, you move on to a new one, and the difficulty of the game increases accordingly.

Castle requires 32K Extended Color BASIC, however, it will run in 16K ECB with the disk controller unplugged. Now load in *Castle* and type RUN. The title screen appears. To continue, press the firebutton on the right joystick. The castle door opens and you enter the castle. A skill level prompt appears. Type a number between one and four (1-easy, 4-hard). There is a short pause, and then the computer reveals what objects are to be picked up on that level. Press the firebutton to play.

The game board appears. All the objects are laid on the castle floor, the bonus score and the number of men you have are displayed at the top of the screen. Your man is then lowered onto the game board.

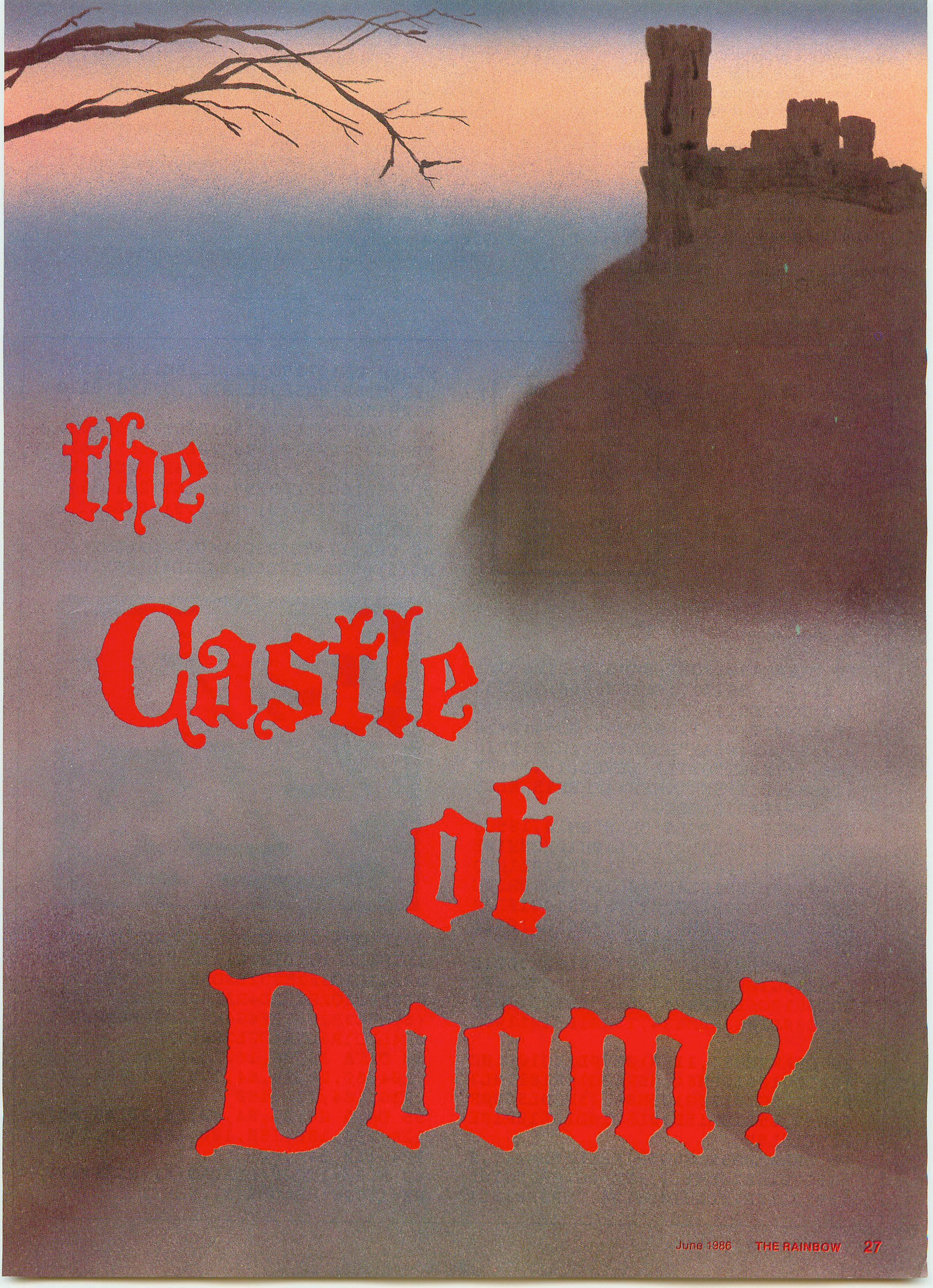
To clear the board, you must pick up all the keys (or other objects) before the bonus countdown runs out, without falling off the path.

When the board is cleared, move to the (white) elevator platform. You are then lifted off that castle level to the next.

After clearing level six, your man makes his way to the castle exit

---

Scott Halfman is a student at Hendrick Hudson High School in Peekskill, New York, where he has completed a BASIC programming course. His hobbies include skiing, football and the CoCo.



the Castle of Doom?

where you are prompted to either quit or go on. The number of castles finished, your score and the high score are displayed. Press 'Q' to quit or 'C' to continue.

If you dare to continue, your man leaves the castle and a new castle approaches.

(You may direct questions about this program to the author at 15 Lake Road, Peekskill, NY 10566, phone 914-739-4758. Please enclose an SASE when writing.) ☐

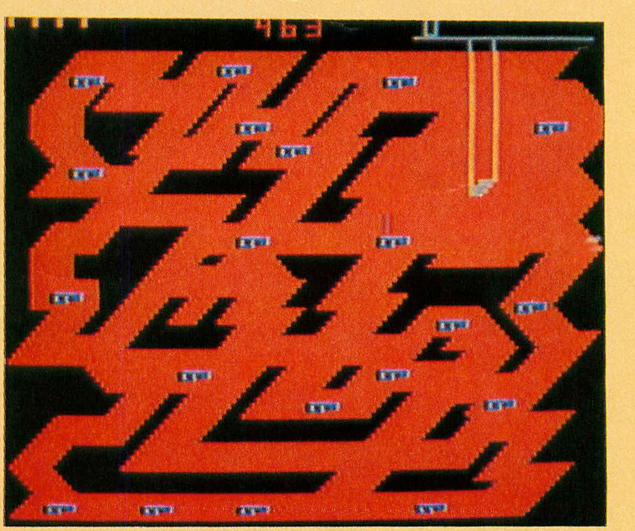
Main Variables

G	array value for man	SK	current skill level
A$(x)	horizontal location of objects	L	speed of movement of man
		I	speed of bonus countdown
B$(x)	vertical location of objects	BO	board level of castle (boards completed)
CR	number of objects left on board	SC$	score
T1, T2, T3	bonus time digits	HS$	high score
GU	number of men left	L1	castle level (castles completed)
A	horizontal location of man		
B	vertical location of man	L$	string value of L1

35	106
70	62
1000	89
2030	110
5013	92
6010	166
7020	233
7070	120
7125	245
8010	120
END	179

The listing: CASTLE

```
10 CLEAR130:POKE65495,0:DIMG(3,1
),A$(21),B$(21):GOSUB8000:GOSUB7
140:PMODE3,1
15 BO=0:T1=9:T2=9:T3=9:GU=4:A=20
0:RESTORE:PLAY"ABCDEFG":CLS:PRIN
T@6,;:INPUT"SKILL LEVEL(1-4)";SK
:I=SK*.2:IFSK<1ORSK>4THEN15 ELSE
 L=17-SK*3.5:GOTO45
20 PMODE3,1:PCLS:DRAW"BM14,185C3
R205E20L20E20L20E30L10H10E20H10E
10H10E10U10H10L10E10L100G20L10E2
0L40G10L10E10L40G20D10F10G10R30G
10L10G10D20R10G20R30F10R10G10L20
G20F10G10R10BM55,120R40E10L10E10
L10G10L10E10L10G20"
25 DRAW"BM34,175R100E10L90E30L10
G20L20G10F10BM154,175E10R30E10R1
0G15R10G5L50BM84,155R70E20L10G10
L50E20L10G30BM134,135R10E10L10G1
0"
30 DRAW"BM34,115R10E40L30G10L10D
10R10D10G10BM64,65R40G10R10E20L2
0E10L10G10L20G10BM84,45E20L5G20R
5BM69,35L10L15E10L5G10D10F10R10E
5L5E15L5"
35 DRAW"BM89,85G5R10E5L10BM147,2
5R5G20L5E20BM114,85R40G20R10G10L
15E10L10E10L5H10BM124,75R20E10L1
0E20R10E10L25G10R5G30BM154,115E1
5L10E15R10G5R35E5R10G20F15G10L10
E10H15L20G10L15"
40 DRAW"BM180,115R10G5R10G5L20E1
0BM189,140R10G5R5G10L15E15":PAIN
T(38,22),3,3:DRAW"BM199,60C4R5U6
0D60G5L5U65D65E5":PAINT(201,61),
4,4:LINE(190,3)-(210,9),PRESET,B
F:RETURN
45 CR$(1)="C2R3D3L4U3R9D2L2U2":C
R$(2)="C2U4R4D6L4U4R3D4L1U6R2D2C
3U1":CR$(3)="C3R3U2C2R2U1D1R1D2R
1L1D1L2D1U1L1U2L1R1U1":CR$(4)="C
3R2U2C2D2F2E2U2L2D6R2L4":CR$(5)=
"C3R2U2C2R6L2D4R2L6R2U4R2D4":CR$
(6)="C3R2U4C2F4G4H4E4D2R2L4R2D1L
2R4L2D1R4L8R4D2L2R4L2"
50 DATA 36,96,162,224,36,104,120
,104,80,28,24,64,176,104,160,204
,216,184,132,160
55 DATA 24,20,24,40,56,40,48,80,
128,100,180,180,180,180,128,140,
104,110,140,80
60 FORX=1TO20:READA$(X):NEXTX:FO
RX=1TO20:READB$(X):NEXTX
```



OS9 + X = POWER

XTERM

OS-9 Communications program.

- Menu oriented
- Upload/download. Ascii or XMODEM protocol
- Execute OS-9 commands from within XTERM
- Definable macro keys
- Works with standard serial port, RS232 PAK, or PBJ 2SP Pack. Includes all drivers.
- Works with standard screen. XSCREEN, or WORDPAK 80 column board

$49.95 with source **$89.95**

XMENU

Creates a menu driven environment for OS-9.

- Create your own menus
- Works with standard screen, XSCREEN, WORDPAK, O-PAK

$29.95 with source **$59.95**

XSCREEN

OS-9 hi-res screen

- 51/64/85 chars per line
- Easy menu operation

$19.95 with source **$39.95**

XDIR & XCAL

Hierarchial directory

- Full sorting
- Complete pattern matching

OS-9 calculator

- Decimal, Hex, Binary
- +, —, *, /, AND, OR, XOR, NOT

$24.95 with source **$49.95**

XDIS

OS-9 disassembler

$34.95

XWORD

OS-9 word processing system.

- Works with standard text screen, XSCREEN, WORDPAK, or O-PAK
- True character oriented full screen editing
- Full block commands
- Find and Replace commands
- Execute OS-9 commands from within
- Proportional spacing supported
- Full printer control, character size, emphasized, italics, overstrike, underline, super/sub-scripts
- 10 header/footers
- Page numbering in decimal or Roman numerals
- Margins and headers can be set different for even and odd pages

$69.95 with source **$124.95**

XMERGE

Mail merge capabilities for XWORD

$24.95 with source **$49.95**

XSPELL

OS-9 spelling checker, with 20000 and 40000 word dictionaries

$39.95

XTRIO

XWORD/XMERGE/XSPELL

$114.95 with XWORD/XMERGE source **$199.95**

XED

OS-9 full screen editor

$39.95 with source **$79.95**

AND FOR RS DOS . . .

SMALL BUSINESS ACCOUNTING This sales-based accounting package is designed for the non-accounting oriented businessman. It also contains the flexibility for the accounting oriented user to set up a double entry journal with an almost unlimited chart of accounts. Includes Sales Entry, transaction driven Accounts Receivable and Accounts Payable, Journal Entry, Payroll Disbursement, and Record Maintenance programs. System outputs include Balance Sheet, Income Statement, Customer and Vendor status Reports, Accounts Receivable and Payable Aging Reports, Check Register, Sales Reports, Account Status Lists, and a Journal Posting List. **$79.95**

ACCOUNTS RECEIVABLE Includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package. **$59.95**

These programs are user friendly and menu driven. Sample transactions are included. Each package features a hi-res screen. Each requires a printer, a minimum of 32k and at least 1 disk drive.

PAYROLL Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware. **$59.95**

DMS Database Management System. Search, sort, calculated fields, disk and tape interfaces. **$24.95**

CBK Complete check register with statement balancing. Includes full amortization program and wage analysis program. **$24.95**

AUTO85 Hi-res screen. 51/64/85 characters per line, inverse characters, automatic line numbering. **$19.95**

MICROTECH
CONSULTANTS
INC. 1906 Jerrold Avenue
St. Paul, MN 55112

Dealer Inquiries Invited
OS-9 is a trademark of Microware

Ordering Information

Add $3.00 shipping & handling, MN residents add 6% sales tax.
Visa, Mastercard, COD (add $2.50), personal checks.

(612) 633-6161

```
70 PR$(1)="PICK UP ALL KEYS":PR$
(2)="LOCK ALL DOORS":PR$(3)="PIC
K UP ALL RINGS":PR$(4)="PICK UP
ALL CUPS":PR$(5)="PICK UP ALL SC
ROLLS":PR$(6)="PICK UP ALL DIAMO
NDS"
80 N$(1)="C1R2C3G2E2D6R2L4":N$(2
)="R4D3L4D3R4":N$(3)="R4D3L3R3D3
L4":N$(4)="D3R4U3D6":N$(5)="R4L4
D3R4D3L4":N$(6)="D6R4U3L4":N$(7)
="R4D2G4":N$(8)="R4D3L4U3D6R4U3"
:N$(9)="D3R4U3L4R4D6":N$(0)="R4D
6L4U6":GOSUB5010
100 PLAY";":A=A+(JOYSTK(0)-32)/L
:B=B+(JOYSTK(1)-32)/L:PUT(A-1,B-
3)-(A+1,B+3),G,NOT
105 T3=T3-I:ON T3+2 GOSUB200:LIN
E(130,3)-(134,9),PRESET,BF:DRAW"
BM130,3"+N$(T3)
110 PUT(A-1,B-3)-(A+1,B+3),G,NOT
:ONPPOINT(A,B+3)GOTO1000,2000,10
0,3000
200 T3=9:T2=T2-1:ONT2+2GOTO210:L
INE(120,3)-(124,9),PRESET,BF:DRA
W"BM120,3"+N$(T2):RETURN
210 T2=9:T1=T1-1:LINE(110,3)-(12
4,9),PRESET,BF:ONT1+2GOTO220:DRA
W"C3BM110,3"+N$(T1)+"BM120,3"+N$
(T2):RETURN
220 T1=5:T2=9:T3=9:FORX=1TO3:PLA
Y"L100;1;2;3;4;5;6;7;8;9;10;11;1
2":NEXTX:PUT(A-1,B-3)-(A+1,B+3),
G,NOT:GOTO1000
1000 IN=3:FORX=B TO191STEP2:X=X+
IN:PUT(A-1,X-3)-(A+1,X+3),G,NOT:
IN=IN+.1
1010 PLAY"AV"+STR$(INT(31-(X/8))
):PUT(A-1,X-3)-(A+1,X+3),G,NOT:N
EXT:ONGU GOTO 6000:GU=GU-1:PUT(G
U*10-1,3)-(GU*10+1,6),G,NOT
1020 B=10:PLAY"V31":IN=0:FORA=2T
O199STEP2:IFA>139THENB=B+1
1025 PUT(A-1,B-3)-(A+1,B+3),G,NO
T:PLAYSTR$(INT(B/4)):PUT(A-1,B-3
)-(A+1,B+3),G,NOT:NEXTA
1030 PUT(A-1,B-3)-(A+1,B+3),G,NO
T:PLAY"O3V15L255":FORX=1TO10:PLA
YSTR$(RND(12)):PAINT(A,B),1,3:PA
INT(A,B),4,3:PAINT(A,B),2,3:NEXT
X:PAINT(A,B),3,3
1040 DRAW"BM110,3;"+N$(T1)+"BM12
0,3"+N$(T2)+"BM130,3"+N$(T3):GOT
O100
2000 CR=CR-1:PAINT(A,B+3),3,3:GO
TO2010
2005 Y=LEN(SC$):FORX=2 TO Y:LINE
(156+10*X,3)-(166+10*X,9),PRESET
,BF:DRAW"BM"+STR$(156+10*X)+",3"
+N$(VAL(MID$(SC$,X,1))):NEXTX:RE
TURN
2010 PLAY"L255ABC":SC$=STR$(VAL(
SC$)+10):GOSUB2005:ONCR GOTO2030
2020 GOTO 100
2030 PUT(A-1,B-3)-(A+1,B+3),G,NO
T:FORV=1TO30STEP6:PLAY"V"+STR$(V
):FORN=1TO12:PLAYSTR$(N):NEXTN,V
:PUT(A-1,B-3)-(A+1,B+3),G,NOT:GO
TO100
3000 IFPPOINT(A-1,B+3)=3ORPPOINT
(A+1,B+3)=3THENGOTO100ELSEB=63:P
LAY"CDEFGAB":X=B'ELEVATOR ROUTIN
E
3010 A=200:FORE1=1TO5:PLAY"O"+ST
R$(E1):FORE2=1TO12:X=X-1:PUT(A-1
,X-3)-(A+1,X+3),G,NOT:PLAYSTR$(E
2):PUT(A-1,X-3)-(A+1,X+3),G,NOT:
NEXTE2,E1
3015 IF CR>1THENGOSUB5030
3020 PLAY"O3":ON CR GOSUB5000:GO
TO100
5000 IFBO=6THENBO=0:GOSUB7000'dr
aw board routine
5005 SC$=STR$(VAL(SC$)+T1*100+T2
*10+T1):GOSUB2005:T1=1:T2=1:T3=1
:DRAW"C3":GOSUB200:LINE(110,3)-(
134,9),PRESET,BF:FORX=1TO30:PUT(
172,3)-(166+LEN(SC$)*10,9),G,NOT
:PLAY"O1A":NEXTX
5010 T1=9:T2=9:T3=9:PCLS:DRAW"BM
110,3"+N$(9)+"BM120,3"+N$(9)+"BM
130,3"+N$(9):BO=BO+1:GU=GU+1:PCL
S:CLS:PRINT@268,"PHASE";BO:PRINT
@288+(32-LEN(PR$(BO)))/2,PR$(BO)
:GOSUB20:IFGU>5THENGU=5
5013 FORX=110TO130STEP10:DRAW"C3
BM"+STR$(X)+",3"+N$(9):NEXTX
```

Amway Distributors - Cocoachiever software package drastically reduces time spent hassling with paperwork! Menue-driven - user friendly, assists in preparation and checking SA-1s or warehouse orders; verification of phoned-in orders; supplies monthly PV/BV totals and calculates monthly refunds. Has wholesale price list stock numbers; can add to or delete stock numbers or distributor files from memory. Required for operation: TRS-80 Color, 64K; Disk:1 - 5¼'' ssdd; Printer: optional, PRICE: $49.95. Contact: T&M Enterprises, 2301 Cromwell Drive, St. Maries, ID 83861. Ph: 208-245-3944.

```
5015 DRAW"C4":LINE(172,2)-(245,2),PSET:LINE(172,10)-(245,10),PSET:GOSUB2005:PLAY"O1ABCDEFG"
5020 PRINT@484,"PRESS FIRE BUTTON TO PLAY";:IFPEEK(65280)=126 OR PEEK(65280)=254 THENSCREEN1,0:POKE65314,248:CR=21 ELSE GOTO5020
5025 FORX=1TO20:PLAY"O1CDEF":DRAW"BM"+A$(X)+","+B$(X)+CR$(BO):NEXTX:FORX=10TOGU*10-10STEP10:PUT(GU*10-1-X,3)-(GU*10-X+1,6),G,NOT:PLAY"O3CDEFG":NEXTX:X=3
5030 FORE1=5TO1STEP-1:PLAY"O"+STR$(E1):FORE2=12TO1STEP-1:X=X+1:PUT(A-1,X-3)-(A+1,X+3),G,NOT:PLAY STR$(E2):PUT(A-1,X-3)-(A+1,X+3),G,NOT:NEXTE2,E1:B=X
5040 PLAY"O3L255V15":FORA=199TO210:PUT(A-1,X-3)-(A+1,X+3),G,NOT:PLAY"12":PUT(A-1,X-3)-(A+1,X+3),G,NOT:NEXTA:DRAW"C3":RETURN
5500 '?score and all that stuff
5510 GOTO 5510
6000 LINE(90,88)-(178,120),PRESET,BF
6010 DRAW"BM100,90C4R4L4D6R4U3L2BM109,90;D6U3R4U3L4R4D6BM116,90;D6U6R3D3U3R3D6BM127,90R4L4D3R2L2D3R4BM140,90R4D6L4U6BM149,90;D4F2E2U4BM157,90R4L4D3R2L2D3R4BM165,90;D6U6R2F2G2L2R2F2"
6020 DRAW"BM97,100D6U3R4U3D6BM104,100R4L2D6L2R4BM113,100R4L4D6R4U3L2BM120,100D6U3R4U3D6BM137,100R4L4D3R4D3L4BM144,100R4L4D6R4BM153,100R4D6L4U6BM160,100D6U6R2F2G2L2R2F2BM169,100R4L4D3R2L2D3R4"
6030 IF VAL(SC$)>VAL(HS$)THEN HS$=SC$:PLAY"V31CDEFGABBAGFEDCCCCCV15"
6040 Y=LEN(HS$)*10:DE=117-Y/2:LINE(127-Y/2,108)-(127+Y/2,118),PRESET,BF:FORX=2TOY/10:DRAW"C3BM"+STR$(DE+X*10)+",110;"+N$(VAL(MID$(HS$,X,1))):NEXTX
6050 POKE178,RND(255):LINE(90,88)-(178,120),PSET,B:IFPEEK(65280)=126ORPEEK(65280)=254THEN6060 ELSE 6050
6060 GOTO 15
7000 CLS'intermission
7010 PCLS:DRAW"C3BM190,45F10L30G100F5R100H10R40F30L40H10L130H15E15R10E100R20F10":PAINT(185,45),3
```

Mouse Technological Software For The Color Computer!

Many Companies call their Home and Business Software User Friendly . . .

NOW AVAILABLE!

ONLY ONE CALLS IT

Child's Play™

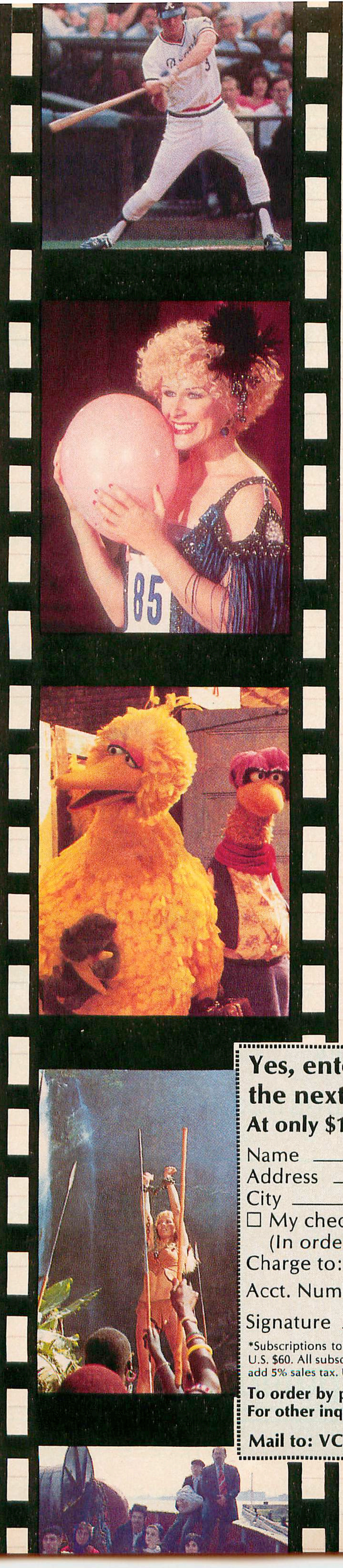
TCE™

Send for FREE Catalog

TCE BUSINESS DIVISION
P.O. BOX 2477
GAITHERSBURG, MD 20879
1-800-4TC-4TCE

MasterCard
VISA

```
,3:DRAW"C4BM190,160R6F6L6H6BM190
,175D16U16F6D10U10R6D10BM175,45U
45D45R6F6U51D51L6U51D51H6"
7015 L1=L1+1:L$=STR$(L1):IF L1>9
9THEN L1=1 ELSE IF L1<10THENL$="
 "+L$
7020 DRAW"C4S40BM10,10"+N$(VAL(M
ID$(L$,2,1)))+"BM60,10"+N$(VAL(M
ID$(L$,3,1)))+"S4":LINE(150,2)-(
245,2),PSET:LINE(150,10)-(245,10
),PSET:LINE(150,3)-(245,9),PRESE
T,BF:GOSUB2005
7025 SCREEN1,1:POKE65314,248:O=5
:P=8:FORX=5TO43:PUT(180,X-3)-(18
2,X+3),G,NOT:P=P-1:IF P=0 THEN P
=8:O=O-1
7026 PLAY"L255O"+STR$(O)+";"+STR
$(P):PUT(180,X-3)-(182,X+3),G,NO
T:NEXTX
7030 PRINT"YOUR SCORE ";SC$:PRIN
T:PRINT"HIGH SCORE ";HS$:PRINT:P
RINT"YOU HAVE COMPLETED LEVEL";L
1:PRINT:PRINT"PRESS <<C>> TO CON
TINUE":PRINT"PRESS <<Q>> TO QUIT
"
7040 A$=INKEY$:IFA$="Q"THENSCREE
N1,0:POKE65314,248:GOTO6000
7045 PLAY"L255O"+STR$(RND(5))+";
"+STR$(RND(12))+"O3"
7050 IF A$<>"C"THEN7040
7060 SCREEN1,0:POKE65314,248:Y=4
5:FORX=181 TO 55STEP-1:PUT(X-1,Y
-3)-(X+1,Y+3),G,NOT:PLAY"A":PUT(
X-1,Y-3)-(X+1,Y+3),G,NOT:IFX<160
THENY=Y+1
7070 NEXTX:FORY=Y TO Y+10:PUT(X-
1,Y-3)-(X+1,Y+3),G,NOT:PLAY"A":P
UT(X-1,Y-3)-(X+1,Y+3),G,NOT:NEXT
Y
7080 FORX=55 TO195:PUT(X-1,Y-3)-
(X+1,Y+3),G,NOT:PLAY"AA":PUT(X-1
,Y-3)-(X+1,Y+3),G,NOT:NEXTX:FOR
Y=Y TO191:PUT(X-1,Y-3)-(X+1,Y+3)
,G,NOT:PLAY"A":PUT(X-1,Y-3)-(X+1
,Y+3),G,NOT:NEXTY
7090 PMODE0,2:PCLS:PMODE0,1:PCLS
:SCREEN1,1:Y1=40:Y2=151:X1=0:X=1
60:UX=0:SCREEN1,1:IN=-3:DE=1:GOT
O7115
7100 X=X+IN:PLAY"O3V31L255B":PMO
DE0,2:PCLS:LINE(97,191)-(97-X/2,
20+X),PSET:LINE-(157+X/2,20+X*.8
),PSET,B:LINE-(157,20),PSET:LINE
-(97,20+X*.8),PSET,B:LINE(97,20)
-(97-X/2,20+X*.8),PSET:LINE(157,
191)-(157+X/2,20+X),PSET
7110 PCOPY2TO1:PMODE0,1:SCREEN1,
1:IFX=DE THEN 7111 ELSEGOTO7100
7111 FORX=31TO1STEP-1:PLAY"O1AV"
+STR$(X):NEXTX:RETURN
7115 GOSUB7100
7120 IG=0:B=0:IN=0:PCLS:FORX=1TO
94:IG=IG+1:PMODE0,2:PCLS:B=B+3+I
N:IFB>120THENIN=IN-.4ELSEIN=IN+.
2
7125 IF IG>47THENIN=IN+.2
7130 LINE(B-X/3,B-X)-(B+X/3,B+X)
,PSET,B:PCOPY2TO1:PMODE0,1:SCREE
N1,1:NEXTX
7140 PMODE0,2:PCLS:SCREEN1,1:X=0
:IN=3:DE=192:GOSUB7100
7150 FORX=1TO20STEP2:PMODE0,2:PC
LS:LINE(97-X,20-X)-(157+X,181+X/
5),PSET,B:LINE(0,181+X/5)-(255,1
81+X/5),PSET:LINE(0,181)-(97-X,2
0-X),PSET:LINE(157+X,20-X)-(255,
181),PSET
7160 PCOPY2TO1:PMODE0,1:SCREEN1,
1:NEXTX
7170 FORX=1TO76STEP4:PMODE0,2:PC
LS::LINE(177+X,181+X/2)-(76-X,0)
,PSET,B:LINE-(0,181+X/2),PSET:LI
NE(177+X,0)-(255,181+X/2),PSET:L
INE(0,181+X/2)-(255,181+X/2),PSE
T
7180 PCOPY2TO1:PMODE0,1:SCREEN1,
1:NEXTX
7190 PLAY"O3ACDDDEFAABV15":RETUR
N
8000 PMODE3,1:POKE179,53:PCLS:SC
REEN1,1:POKE65314,248:POKE179,3:
PAINT(0,191),1,4
8010 DRAW"BM36,70R32L32G30R32E5L
22E15R22E10R1C1R5;C4G30R6E20R10G
20R6E30L20R7G1C1G2C4R5G5L5E6C1E2
C4R15C1R5;C4R32G10L22G6R22G14L32
E6R22E4L22E20R33C1R3;C4R32G10L12
G20L6E20L12E10R32C1R7;C4R6G10L2G
14R24G6L32E30R10C1R28"
8020 DRAW"C4R32G10L22G5R22G5L22G
5R22G5L32E30BM96,105R6G6L6E6R7C1
R3C4R6L6G3R3L3G3E6R7C1R12;C4R4D3
G3L9E6R5C1R8;C4R6G6L6E6R7C1R3;C4
R6G6L6E6R7C1R4;C4G6E6R3G3E3R4G6"
8030 FORX=50TO230STEP32:PAINT(X,
75),3,4:NEXTX:PAINT(70,75),3,4
8035 POKE65494,0:PLAY"V15O1L9CP3
0CP3CP30CP3":PLAY"L2CL9DP2L2CL9D
P2L2CL4DL3E-L2CL20":FORX=15TO1ST
EP-1:PLAY"GL30G-V"+STR$(X)+"L20"
:NEXTX:POKE65495,0
8040 FORX=1TO255:POKE178,X:LINE(
3,65)-(250,120),PSET,B
8050 IFPEEK(65280)=127ORPEEK(652
80)=255THENNEXTX:GOTO8040ELSELIN
E(5,65)-(250,120),PRESET,B:POKE1
78,53:PAINT(0,0),,2:POKE178,3:RE
TURN
```



VCR

THE HOME VIDEO MONTHLY

A funny thing has happened in the home video market. As it gets easier and easier to watch what you want, it gets harder and harder to decide what that might be.

Dozens of new tapes are released into the stores every week, along with hundreds of hours of programming on the network and cable channels. It has reached a point where even the most devoted videophile can use a little help sorting through it all.

Now that help is available.

Inside **VCR** you will find clear, easy-to-read reviews of all the best new releases. You'll find out about little-known videos — what they're about and where to get them. And in the feature articles, you'll find some very entertaining reading about the entertainment business.

Now that you've discovered **VCR**, you won't want to risk missing a single issue. You can save yourself the trouble of walking to the newsstand each month, and save yourself some money at the same time.

Just fill out the attached card and drop it in the mail. Or even easier, call (502) 228-4492 and ask for Sandy. She'll see to it that **VCR** is delivered right to your door each and every month of the year.

Yes, enter my subscription for the next 12 issues of VCR.

At only $15, that's 36 percent off the regular newsstand price.

Name ____
Address ______________________________________
City ____________________ State ________ ZIP ________
☐ My check in the amount of _________ is enclosed.
(In order to hold down costs, we do not bill.)
Charge to: ☐ VISA ☐ MasterCard ☐ American Express
Acct. Number ________________________ Exp. Date ________
Signature ______________________________________

*Subscriptions to **VCR** are $15 a year in the United States. Canadian rate is U.S. $22. Air mail rate elsewhere is U.S. $60. All subscriptions begin with the current issue. Please allow 6 to 8 weeks for first copy. Kentucky residents add 5% sales tax. **U.S. currency *only*, please.** In order to hold down non-editorial costs, we do not bill.

To order by phone (*credit card orders only*) call 1-800-847-0309, 8 a.m. to 5 p.m. EST.
For other inquiries call 1-502-228-4492.

Mail to: VCR, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

800-443-1444 ORDERS

SPECIALS

Howard Medical Computers

Zenith 130 Color Monitor $159

Was $399
($14 shipping)

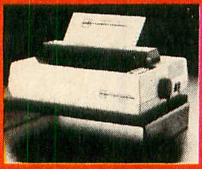
- Medium resolution 2.5 MHz 240 x 200 dots
- Same as 131 except No RGB
- With 90 day Zenith warranty
- **Monitors require video controller See page 34**

NEW 40 COLUMN

Epson RX-80FT $207

REPACK

Was $318
($7 shipping)



- Friction and tractor 80 column
- Bidirectional dot addressable 100 CPS
- **Free Howard Printer tutorial included (a $29.95 value)**

RX100 . . . . NEW $362

Zenith Green Monitor $67⁵⁰

Reg. $149
($7 shipping)

- 12" Zenith 123A Green Screen is easy on the eyes
- High resolution: 640 dots x 200 dots, 15 MHz band width
- Composite video monochrome

REPACK 80 COLUMN

J&M Controller $128

JFD-CP with JDOS

Reg. $149
($2 shipping)

- Metal case: I/O buffered
- Parallel port for Gemini and Epson printers
- Hard Disk driver included
- Single switch lets you switch from J DOS to RS DOS
- Gold contacts & data separator

RS DOS ROM $20/ea.

Reg. $40
($2 shipping)

- ROM chip makes J&M compatible
- 24 pin fits both versions of J&M controller
- Release 1.1

Howard Medical Computers

Box 2, Chicago, IL 60690
Hours: 8-4 Mon.-Fri.
10-3 Sat.
(312) 278-1440

Howard Medical offers a 30-day return guarantee on all hardware we sell. Return equipment to us within 30 days for a refund (less shipping) if you are unsatisfied for any reason. Quantities limited and subject to availability.

The Biggest

The Best

The Indispensable

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE

It's called the *premier Color Computer magazine* for good reason. **THE RAINBOW** is the biggest, best, brightest and most comprehensive publication a happy CoCo ever had! Is there any wonder we get letters daily praising **THE RAINBOW**, the magazine one reader calls "A Pot Of Gold" for his Color Computer.

THE RAINBOW features more programs, more information and more in-depth treatment of the Tandy Color Computer than any other source.

A monthly issue contains up to 300 pages and as many as two dozen programs, 15 regular columns and more than 20 product reviews. And advertisements: **THE RAINBOW** is known as *the* medium for advertisers — which means every month it has a wealth of information unavailable anywhere else about new products! Hundreds of programs are advertised in its pages each month.

But what makes **THE RAINBOW** is its people. People like Fred Scerbo, who write special programs at the request of readers. Experts like Dick White and Joseph Kolar, two of the most knowledgeable writers on BASIC. Communicators like R. Wayne Day, who stay abreast of telecommunications advances. Or, Dan Downard, **RAINBOW** technical editor, who answers our readers' toughest questions. Educators like Dr. Michael Plog and Steve Blyn, who show how CoCo can be used at home or school. Advanced programmers like Dale Puckett, who guide you through the sophisticated OS-9 operating system. Electronics experts like Tony DiStefano, who explain the "insides" of the CoCo. These people, and many others, visit you monthly through columns available only in **THE RAINBOW**.

Every single issue of **THE RAINBOW** covers the wide spectrum of interests in the Tandy Color Computer — from beginners' tutorials and arcade games to telecommunications and business and finance programs. Helpful utilities and do-it-yourself hardware projects make it easy and fun to expand your CoCo's capabilities. And, monthly reviews by independent reader reviewers take the guesswork out of buying new software and hardware products.

Join the tens of thousands who have found **THE RAINBOW** to be an absolute necessity for their CoCo. With all this going for it, is it surprising that more than 90 percent of **THE RAINBOW** subscribers renew their subscriptions?

We're willing to bet that, a year from now, you'll be doing the same. For more information call (502) 228-4492.

Rainbow On Tape Tops Typing

Tired of spending all your valuable computer time typing in those long, but wonderful, **RAINBOW** programs each month? Now there is **RAINBOW ON TAPE** to help ease the pain.

Each month all the lengthy programs (over 20 lines) in **THE RAINBOW** can come to you ready-to-run, thanks to **RAINBOW ON TAPE**. At $80* per year — or $10 a tape ★★ — it is the biggest bargain going. *(Note: **RAINBOW ON TAPE** will not run on Dragon or MC-10 computers.)*

Back issues are available beginning with April 1982 (except May 1983). Each month's tape will arrive at approximately the same time as that month's issue of **THE RAINBOW**.

YES! Sign me up: ☐ *NEW* ☐ *RENEW (Attach Label)*
☐ *A Full Year* ☐ *A Month (Specify Month & Year* ________ *)*
Name SHirley Helm
Address 1530 N 4th 40th ST.
City stoNE park *State* ILL. *ZIP* 60165
☐ Payment Enclosed (Payment must accompany order)
Charge: ☐ VISA ☐ MasterCard ☐ American Express
Account Number ____________
Signature ____________ Card Expiration Date ____________

*Subscriptions to **RAINBOW ON TAPE** are $80 in the United States, $90 U.S. funds in Canada and $105 U.S. funds in all other countries. **In order to hold down non-editorial costs, we do not bill.** Kentucky residents add 5% sales tax.
★★ Individual back issues of the tapes are $10 in the United States, $12 U.S. funds for Canada and all other countries.

Get Your Very Own Pot O' Gold!

Here's your chance to have a Pot O' Gold full of programs, articles and information about CoCo every month of the year! A subscription to **THE RAINBOW** is only $31* and you won't miss a single chock-full issue.

As the premier magazine for the Tandy Color Computer, **THE RAINBOW** has more of everything — and greater variety, too. Do yourself and your CoCo a favor and subscribe to **THE RAINBOW** today!

We accept VISA, MasterCard and American Express. Non-U.S. rates higher. **U.S. currency *only*, please.**

YES! Sign me up for a year (12 issues) of **THE RAINBOW.**
☐ *NEW* ☐ *RENEW (Attach Label)*
Name ____________
Address ____________
City ________ *State* ________ *ZIP* ________
☐ Payment Enclosed (Payment must accompany order)
Charge: ☐ VISA ☐ MasterCard ☐ American Express
Account Number ____________
Signature ____________ Card Expiration Date ____________

*Subscriptions to **THE RAINBOW** are $31 a year in the United States. Canadian rate is U.S. $38. Surface rate elsewhere is U.S. $68. Air mail U.S. $103. All subscriptions begin with the current issue. Please allow 5 to 6 weeks for first copy. Kentucky residents add 5% sales tax. **In order to hold down non-editorial costs, we do not bill.**

What goes well with *the Rainbow?*

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE
FOCUS ON EDUCATION
CoCo Breakthrough!
Plus
The RAINBOW
on tape

Rainbow On Tape!

We call it the other side of **THE RAINBOW** and we may have to raise the price just to call your attention to it. With as many as two dozen programs every month, **RAINBOW ON TAPE** is a luxury service at a bargain basement price.

What is it? **RAINBOW ON TAPE** is a monthly cassette tape adjunct to **THE RAINBOW** and it's brimming with all the programs (those over 20 lines long) that fill the pages of the magazine. All you do is pop the cassette in your tape recorder and they're ready to run. No more lost weekends — or week nights — typing, typing, typing. With **RAINBOW ON TAPE**, you can read the article in the magazine then, in seconds, you load it up and run it. Yes, you could type them in yourself, as many people do. But all of them? Every month? There simply isn't enough time.

Isn't it time your CoCo became a full-time computer instead of a typewriter? Think how your software library will grow. With your first year's subscription, you'll get almost 250 new programs: games, utilities, business programs, home applications — the full spectrum of **THE RAINBOW'S** offerings without the specter of keying in page after page and then debugging.

RAINBOW ON TAPE — the "meat" of **THE RAINBOW** at a price that's "small potatoes." Food for thought. To get your first heaping helping, just fill out and return the attached reply card. No postage necessary.

Discover the other side of **THE RAINBOW**. It's not only a time-saver, it's the key to a whole new outlook!

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 1 PROSPECT, KY

POSTAGE WILL BE PAID BY ADDRESSEE

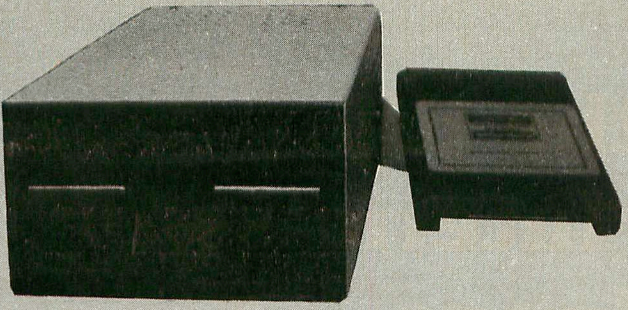
The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 1 PROSPECT, KY

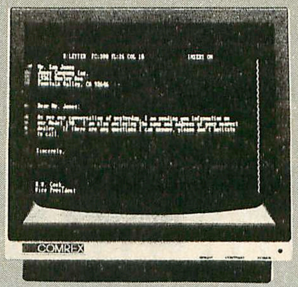
POSTAGE WILL BE PAID BY ADDRESSEE

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE
The Falsoft Building
P.O. Box 385
Prospect, KY 40059



Drive 0 and 1 **279^{95}**

One double sided drive with doubler board and new RS controller so you can have the equivalent of 2 drives in one. You can even backup from 0 to 1. Works with all CoCo's.



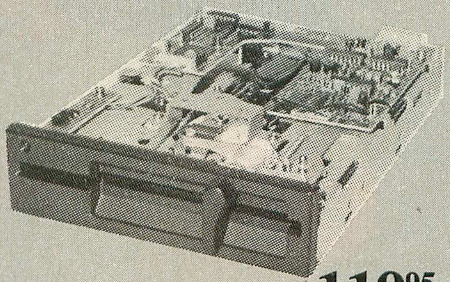
AMBER MONITOR 59^{95}

Epson's Comrex 5650 has a 12" screen with 900 lines. Resolution for 80 column text and 18 MHZ band width. Retail price is 139.95. These are new, in factory sealed cartons, NOT used, repacked, or refurbished. Add 7.00 s/h. Monitor Interface for any Color Computer 29.95.

---

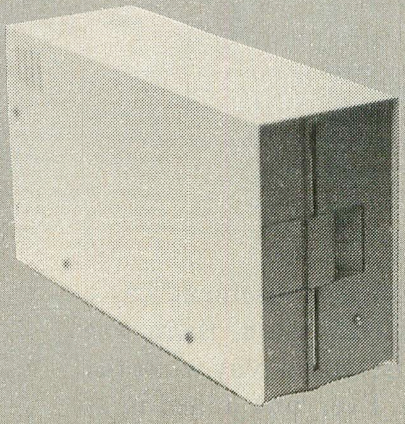
2 Drives **299^{95}**

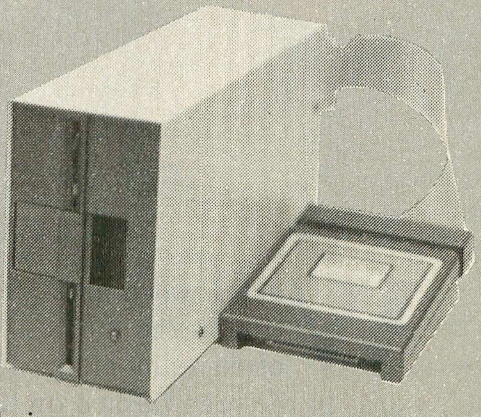
Both our drive 0 and 1 in one case, with cable and R.S. controller. The best just got better!



Drive 1 Upgrade **119^{95}**

Add a second ½ height drive to your Radio Shack 26-3129. Comes with 3 minute installation instructions, screwdriver required. Double sided version (Drive 1 and 2) and doubler board add 79.00





Drive 1 **125^{95}**

Your Choice
Silver or White

199^{95} Drive 0

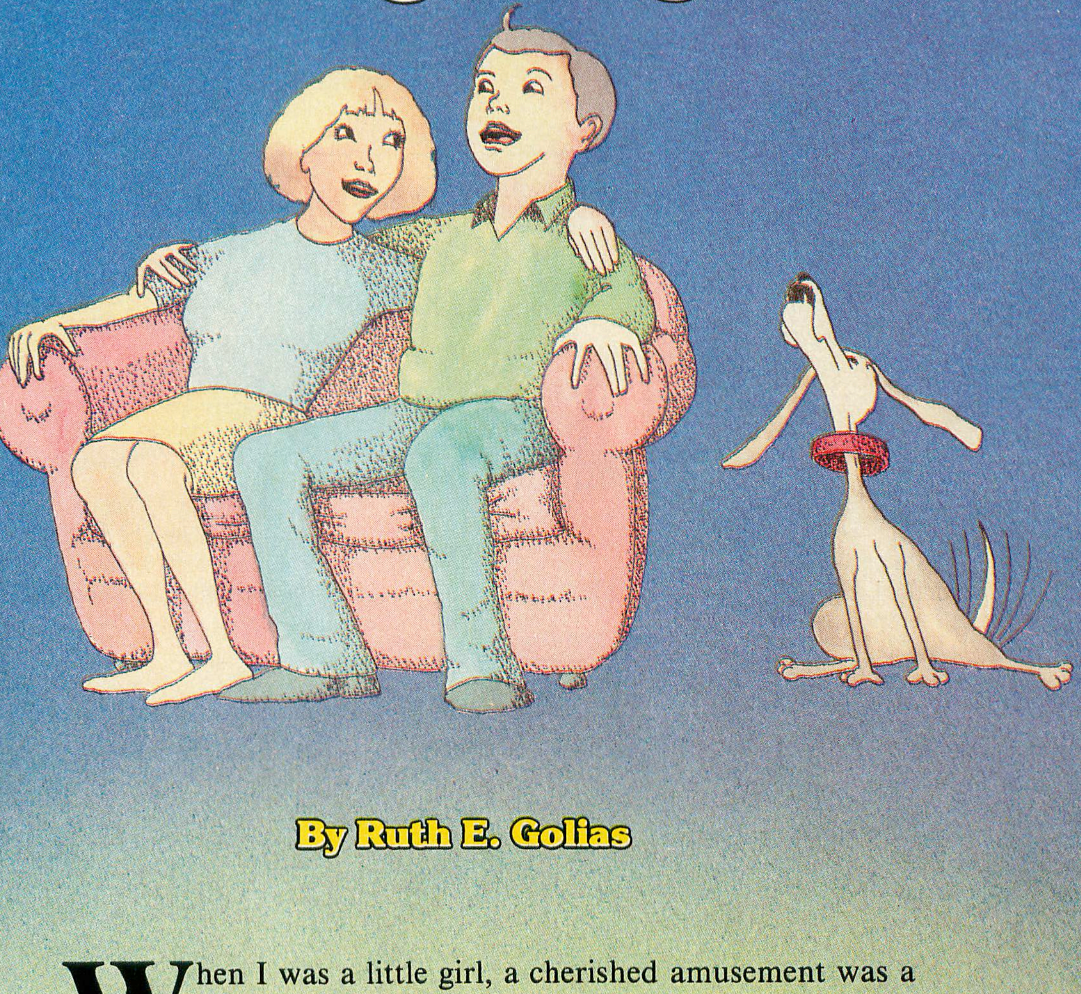
SUPER DRIVE SALE

Special prices on new first quality disk drives. They even have GOLD connectors on the back... Some other places charge 229.00 for dr. 1 and 299.00 for dr. 0, not us! Drive 1 is for mod I, Second Color Computer drive, or external mod III, IV. Drive 1 just plugs into the extra connector on your Drive 0 cable. Both drives are compatible with any version of the Color Computer and all versions of drives. Drive 0 is your first Color Computer drive and comes complete with cable, manual, and R.S. controller. For double-sided drive and doubler board add 79.00 (for Drive 0 & 1 or 1 & 2). Bare full hgt SSDD drive only 79.95.

THE COMPUTER CENTER
901-761-4565, 5512 Poplar, Memphis, TN 38119

Add $4.90 for shipping and handling—Visa, MC & money orders accepted, No CODs
Allow an additional 2 weeks for personal checks—Drive faceplates may vary slightly
Prices subject to change without notice.

Saturday at the Bijou — Remembering Intermission Sing-alongs



By Ruth E. Golias

When I was a little girl, a cherished amusement was a trip to the movies. During intermission, there was often a sing-along. The organist would play while the words to the song flashed on the screen. Everyone joined in as the master of ceremonies led the singing.

With *Sing-Along* I have tried to evoke that long-ago era when the audience was so much a part of the entertainment. I used the `PRINT @` statements rather than graphics because I find them very interesting. Enjoy!

(Questions about this program may be directed to the author at 2826 Pacific Coast Highway, Torrance, CA 90505, phone 213-325-1384. Please enclose an SASE when writing.) ☐

Ruth Golias has retired from the Torrance Police Department wnere she did microfilming. She is learning to program her CoCo and it has become her hobby.

120	136	720	40
230	137	840	46
330	47	930	56
440	60	1050	218
530	150	1140	205
630	248	END	206

The listing: SINGLONG

```
10 'SING-ALONG-BY RUTH E. GOLIAS
2 '----TORRANCE, CALIFORNIA----
20 '
30 CLS4:FORB=32TO448STEP21:PRINT
@B,"SING-ALONG";:NEXT:SCREEN0,1
40 GOSUB1220
50 CLS6: PRINT@136,"NOW, LET'S B
EGIN,";:PRINT@295,"SING ALONG WI
TH ME.";:SCREEN0,1
60 GOSUB1220
70 CLS:PRINT@134,"I DON'T WANT T
O PLAY";:PRINT@170,"IN YOUR YARD
";:PRINT@236,"********";:PRINT@2
92,"WORDS BY PHILIP WINGATE";:PR
INT@326,"MUSIC BY H.W.PETRIE";:P
RINT@365,"1894";:SCREEN0,1
80 GOSUB1220
90 CLS3:FORB=35 TO 450STEP20:PRI
NT@B,"I"CHR$(175)"DON'T";:NEXT:S
CREEN0,1:PLAY"O2L8FA"
100 CLS3:FORB=34 TO 450STEP21:PR
INT@B,"WANT"CHR$(175)"TO";:NEXT:
SCREEN0,1:PLAY"O3CO2A"
110 CLS3:FORB=34 TO 450STEP21:PR
INT@B,"PLAY"CHR$(175)"IN";:NEXT:
SCREEN0,1:PLAY"FD"
120 CLS3:FORB=33 TO 450STEP21:PR
INT@B,"YOUR"CHR$(175)"YARD";:NEX
T:SCREEN0,1:PLAY"L4EL4.E"
130 GOSUB1220
140 GOSUB1240
150 PRINT@230,"I DON'T WANT TO P
LAY                IN YOUR YARD,
":PLAY"T2L8FAO3CO2AFDL4.EEP4"
160 PRINT@224,"        I DON'T L
IKE YOU                    ANY M
ORE,":PLAY"L8GB-O3L8DO2B-GEO3L2.
C"
170 PRINT@224,"      YOU'LL BE S
ORRY WHEN                YOU SEE
 ME,":PLAY"O2L8FAO3CO2AFDL4.EE"
180 PRINT@224,"        SLIDING D
OWN OUR                  CELLAR
DOOR,":PLAY"L8AGBAFDL2.G"
190 PRINT@230,"YOU CAN'T HOLLER
DOWN              OUR RAIN BARRE
L,":PLAY"L8FAO3CO2AFDL4.EEP4"
200 PRINT@224,"        YOU CAN'T
 CLIMB                 OUR APPLE
 TREE,":PLAY"L8GB-O3DO2B-GEO3L2.
CL4C#"
210 PRINT@230,"I DON'T WANT TO P
LAY                IN YOUR YARD"
:PLAY"L8DE-DO2DF#AO3L4.CO2B-P4"
220 PRINT@230," IF YOU WON'T BE
                  GOOD TO ME.":
SCREEN0,1:PLAY"L8AGB-GL8..ECL4L2
..F"
```

One-Liner Contest Winner . . .

Here's one to frighten even the toughest of you. Type it in and RUN it. You might even want to bring it back out for Halloween.

The listing:

```
10 PMODE 2,1:SCREEN 1,1:PCLS(1):
PMODE4,1:SCREEN1,1:PCLS:N=RND(4)
:FOR T=1 TO N:Z=RND(11):X=RND(23
0):Y=RND(100):LINE(X,0)-(X+10,Y)
,PSET:LINE-(X,Y+Z),PSET:LINE-(X+
20,Y+80),PSET:NEXT T:PCLS:FOR W=
1 TO X*9:NEXT W:GOTO 10
```

John Collicott
Inman, Kansas

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

One-Liner Contest Winner . . .

Try using this program to encode secret messages to your friends. You might try to use this routine in a larger program that would encode and decode the messages for you.

The listing:

```
10 INPUT"MESSAGE";M$:INPUT"SHIFT
(1-25)";S:PRINT:FORN=1TOLEN(M$):
P$=MID$(M$,N,1):IF ASC(P$)<65 OR
 ASC(P$)>90 THEN PRINTP$;:NEXTN
ELSE K=ASC(P$)+S:IF K>90 THEN K=
K-26:PRINTCHR$(K);:NEXTN ELSE PR
INTCHR$(K);:NEXTN:PRINT
```

Richard Delval
Cardiff, California

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

```
230 GOSUB1220
240 CLS:PRINT@134,"MEET ME IN ST
. LOUIS":PRINT@226,"WORDS BY AND
REW B. STERLING":PRINT@262,"MUSI
C BY KERRY MILLS":PRINT@333,"190
4":SCREEN0,1
250 GOSUB1220
260 CLS6:FOR B=35 TO 450STEP20:P
RINT@B,"MEET"CHR$(223)"ME";:NEXT
:SCREEN0,1:PLAY"T4O2L2CL4D"
270 CLS6:FORB=33 TO 448 STEP51:P
RINT@B,"IN"CHR$(223)"ST."CHR$(22
3)"LOUIS";:NEXT:SCREEN0,1:PLAY"T
4L2EL4FL2GO3L4E"
280 CLS6:FOR B=32 TO 448 STEP45:
PRINT@B,"LOUIS";:NEXT:SCREEN0,1:
PLAY"CO2L4G"
290 GOSUB1220
300 GOSUB1240
310 PRINT@228,"MEET ME IN ST.LOU
IS, LOUIS,        MEET ME AT THE
 FAIR.":PLAY"T4O2L2CL4DL2EL4FL2G
O3L4EL4CO2L2GL2AO3L4CO2L2BL4AL2.
GL2GP4"
320 PRINT@227,"DON'T TELL ME THE
 LIGHTS ARE    SHINING ANY PLACE
 BUT THERE.":PLAY"T4O2L2CL4DL2EL
4FL2GO3L4EL4CO2L2GO2L2AO3L4DL2DL
4EL2.DL4D"
330 PRINT@224,"        WE WILL D
ANCE THE               'HOOCH-EE
KOOCH-IE,'":PLAY"L4DL4D#L2EL4DL2
CL4O2BO3L4EO2L2AL4A"
340 PRINT@224,"         I WILL B
E YOUR                 TOOTSIE W
OOTSIE.":PLAY"L4G#L4AO3L2DL4CO2L
2BL4AO3L4DO2L2GL4GL4EL4D"
350 PRINT@224,"   MEET ME IN ST.
LOUIS, LOUIS,         MEET ME AT
THE FAIR.":SCREEN0,1:PLAY"T4O2L2
CL4DL2EL4FL2GO3L4EL4.CO2L2.GL2AO
3L4CO3L2DO2L4GO3L2.CL2C
360 GOSUB1220
370 CLS:PRINT@164,"A BICYCLE BUI
LT FOR TWO":PRINT@206,"BY":PRINT
@234,"HARRY DACRE":SCREEN0,1
380 GOSUB1220
390 CLS7:FORB=33 TO 448 STEP21:P
RINT@B,"A"CHR$(239)"BICYCLE";:NE
XT:SCREEN0,1:PLAY"O2L4B-O3L2CAF"
400 CLS7:FORB=33 TO 448 STEP21:P
RINT@B,"BUILT"CHR$(239)"FOR";:NE
XT:SCREEN0,1:PLAY"L2GL4C"
410 CLS7:FORB=34 TO 450 STEP49:P
```

AVAILABLE NOW

DRAGON USER

To make the most of your new Dragon microcomputer from Dragon-Tano, you need *Dragon User* — the international, independent magazine for Dragon owners.

Each issue of *Dragon User* contains:
- reviews of the latest software
- programming advice for beginners
- hardware projects
- program listings covering games and utilities
- reviews of Dragon peripherals and add-ons
- technical advisory service
- programming articles for users

The Dragon microcomputer was launched in the UK last year. Since then we have developed a knowledge and mastery of the machine's abilities. You can benefit from our experience by subscribing to *Dragon User*, which is expanding its coverage to include all US developments.

To make sure that you receive a copy of *Dragon User* regularly, subscribe direct to us. This costs only $29.95 for 12 issues airspeeded to you — or take advantage of our special offer to long-term subscribers. Individual copies of the magazine can be obtained from your Dragon dealer.

Subscription order form. Receive a free book and save money by taking out a long-term subscription — a two-year subscription saves 10%, a three-year subscription saves 20%. In addition, long-term subscribers will receive a free copy of either ☐ *The Working Dragon* or ☐ *Dragon Games Master*. Please send a check, made payable to *Dragon User*, with this form.

Start my subscription from the following issue ....

Name..........

Address..........

....

Signed.......... Date..........

Subscription rates US and Canada airspeeded ☐ US$29.95 for 12 issues/1 year ☐ US$53.90 for 24 issues ☐ US$71.90 for 36 issues. Send this form to *Dragon User*, % Business Press International, 205 E. 42nd St., New York, NY 10017.

```
RINT@B,"TWO";:NEXT:SCREEN0,1:PLA
Y"L2..F"
420 GOSUB1220
430 GOSUB1240
440 PRINT@233,"DAISY, DAISY,
          GIVE ME YOUR ANSWER, D
O":PLAY"T5O3L2.CO2AFCL4DEFL2DL4F
L2...C"
450 PRINT@233,"I'M HALF CRAZY,
           ALL FOR THE LOVE OF Y
OU!":PLAY"L2.GO3L2.CO2L2.AFL4DEF
L2GL4AL2...G"
460 PRINT@225,"IT WON'T BE A STY
LISH MARRIAGE.    I CAN'T AFFORD
 A CARRIAGE.":PLAY"L4AB-AGO3L2CO
2L4AGL2...FL4GL2AL4FL2DL4FDL2...
C"
470 PRINT@224,"      BUT YOU'LL
LOOK SWEET,               ON THE
 SEAT,":PLAY"L4CL2FL4AL4...GP8P8
L2FL4AGP4P8"
480 PRINT@224,"       OF A BICYC
LE BUILT,             OF A BICYC
LE BUILT,":PLAY"L8AB-O3L4CO2AFGP
4P8L8AB-O3L4CO2AFGP4P8"
490 PRINT@224,"
                  OF A BICYCLE B
UILT FOR TWO!":SCREEN0,1:PLAY"L8
AB-O3L4CO2AFL2GL4CL2..FL4F"
500 GOSUB1220
510 CLS:PRINT@168,"AFTER THE BAL
L":PRINT@206,"BY":PRINT@231,"CHA
RLES K. HARRIS":SCREEN0,1
520 GOSUB1220
530 CLS6:FORB=33 TO 479 STEP 48:
PRINT@B,"AFTER"CHR$(223)"THE"CHR
$(223)"BALL";:NEXT:SCREEN0,1:PLA
Y"T4O2L2.ABL4GO3L2.CC"
540 GOSUB1220
550 GOSUB1240
560 PRINT@228,"AFTER THE BALL IS
 OVER,         AFTER THE BREAK O
F DAWN.":PLAY"T4O3L4EGEL2CO2L4AO
3L2.CO2L2.GO3L4EGEL2CO2L4AL2...B
"
570 PRINT@227,"AFTER THE DANCER'
S LEAVING,     AFTER THE STARS A
RE GONE.":PLAY"O3L4FAFL2EL4DL2.C
#DL4DEDO2L2BL4GO3L2..G"
580 PRINT@224,"     MANY A HEART
 IS ACHING;       IF YOU COULD R
EAD THEM ALL,":PLAY"L4EGEL2CO2L4
AO3L2.CO2L2.GL4AO3C#EL2AL4GL2...
F
590 PRINT@224,"         MANY THE
 HOPES                THAT HAVE
VANISHED":PLAY"L4GDDDEFL2.EO2G"
600 PRINT@224,"":PRINT@255,"
     AFTER THE BALL.":SCREEN0,1:
PLAY"ABL4GO3L2...C"
610 GOSUB1220
620 CLS:PRINT@133,"IN MY MERRY O
LDSMOBILE":PRINT@204,"********":
PRINT@261,"WORDS BY VINCENT BRYA
N":PRINT@294,"MUSIC BY GUS EDWAR
DS":SCREEN0,1
630 GOSUB1220
640 CLS1:FORB=32 TO 448 STEP21:P
RINT@B,"IN"CHR$(143)"MY"CHR$(143
)"MERRY";:NEXT:SCREEN0,1:PLAY"T4
O3L4CO2BL2AL4E"
650 CLS1:FORB=33 TO 448 STEP21:P
RINT@B,"OLDSMOBILE";:NEXT:SCREEN
0,1:PLAY"L2AL4EL2.AL4A"
660 GOSUB1220
670 GOSUB 1240
680 PRINT@228,"COME AWAY WITH ME
 LUCILLE,        IN MY MERRY OLD
SMOBILE,":PLAY"T5L2O3DL4CO2L2BL4
DL2BL4DL2.BL4BO3CO2L4BL2AL4EL2AL
4EL2.AL4A"
690 PRINT@224,"DOWN THE ROAD OF
LIFE WE'LL FLY     AUTOMOBUBLING
 YOU AND I.":PLAY"L4AGL2F#O3L4DL
2DL4DL2.DO2L4DEF#GO3L2DDL4DL2.D"
700 PRINT@224,"           TO THE
CHURCH                WE'LL SWIF
TLY STEAL,":PLAY"L2DL4CO2L2BL4DL
2BL4DL2.BL4B"
710 PRINT@224,"      THEN OUR WE
DDING BELLS               WILL
PEAL,":PLAY"O3CO2BL2AL4EL2AL4EL2
.AL4A"
720 PRINT@230,"  YOU CAN GO AS F
AR,             AS YOU LIKE WITH
 ME":PLAY"AGL2F#O3L4DDC#DL2EL4DO
2L4B"
730 PRINT@224,"": PRINT@256,"
   IN MY MERRY OLDSMOBILE.":SCRE
EN0,1:PLAY"AGL2AL4G#L2AL4BL2.GO3
L2G"
740 GOSUB1220
750 CLS:PRINT@194,"GIVE MY REGAR
DS TO BROADWAY":PRINT@265,"BY":P
RINT@334,"GEORGE M. COHAN":SCREE
NO,1
760 GOSUB1220
770 CLS7:FORB=34 TO 448 STEP21:P
RINT@B,"GIVE"CHR$(239)"MY";:NEXT
:SCREEN0,1:PLAY"L4CL2D"
780 CLS7:FORB=33 TO 448 STEP21:P
RINT@B,"REGARDS"CHR$(239)"TO";:N
EXT:SCREEN0,1:PLAY"L4EL2FG"
790 CLS7:FORB=34 TO 448 STEP21:P
RINT@B,"BROADWAY";:NEXT:SCREEN0,
1:PLAY"L1FL2.E"
800 GOSUB1220
810 GOSUB1240
```

```
820 PRINT@224,"  GIVE MY REGARDS
 TO BROADWAY,    REMEMBER ME TO 
HERALD SQUARE.":PLAY"T4O2L4CL2DL
4EL2FGL1FL2.EL4CDDDDL2EEL1C"
830 PRINT@224,"       TELL ALL T
HE GANG,            AT FORTY SEC
OND STREET":PLAY"L4CL2DL4EL2FDEF
L4GED"
840 PRINT@224,"
                  THAT I WILL SO
ON BE THERE.":PLAY"CL2FDEFL1GL2.
G"
850 PRINT@224,"         WHISPER 
OF HOW,                  I'M YEA
RNING":PLAY"L4CL2DL4EL2FGL1FL2.E
"
860 PRINT@224,"         TO MINGL
E WITH               THE OLD TIM
E THRONG.":PLAY"L4CDDDDL2EEL1CC"
870 PRINT@224,"         GIVE MY 
REGARDS                 TO OLD B
ROADWAY":PLAY"L4AL2F#L4DL2B-AGF#
L4G"
880 PRINT@224,"   AND SAY THAT I
'LL BE THERE              E'ER L
ONG.":SCREENO,1:PLAY"FGFL2AFFGL1
FL2F"
890 GOSUB1220
900 CLS:PRINT@167,"I'VE BEEN WOR
KING":PRINT@200,"ON THE RAILROAD
":PRINT@271,"A":PRINT@331,"FOLK
SONG":SCREEN0,1
910 GOSUB1220
920 CLS4:FORB=32 TO 448 STEP22:P
RINT@B,"I'VE"CHR$(191)"BEEN";:NE
XT:SCREEN0,1:PLAY"T4O2L2FL4C"
930 CLS4:FORB=32 TO 479 STEP25:P
RINT@B,"WORKING"CHR$(191)"ON";:N
EXT:SCREEN0,1:PLAY"FCF
940 CLS4:FORB=33 TO 479 STEP23:P
RINT@B,"THE"CHR$(191)"RAILROAD";
:NEXT:SCREEN0,1:PLAY"GL1AF"
950 GOSUB1220
960 GOSUB1240
970 PRINT@232,"I'VE BEEN WORKING
":PRINT@265,"ON THE RAILROAD":PL
AY"T5L2.FL4CFCFGL1AF"
980 PRINT@224,"":PRINT@262,"ALL
THE LIVE LONG DAY,":PLAY"L2.B-L4
B-L2FGL1AA"
990 PRINT@232,"I'VE BEEN WORKING
":PRINT@262,"   ON THE RAILROAD"
:PLAY"L2.FL4CFCFGL1AL2F"
1000 PRINT@231,"   JUST TO PASS"
:PRINT@264," THE TIME AWAY.":PLA
Y"L4AAL2AGGAL1GG"
1010 PRINT@232," CAN'T YOU HEAR"
:PRINT@262,"THE WHISTLE BLOWING,
":PLAY"L2.GL4GF#GAGL1FC"
1020 PRINT@233,"RISE UP SO EARLY
":PRINT@261,"      IN THE MORN,"
:PLAY"L2B-L4B-B-FFGGL1AA"
1030 PRINT@233,"CAN'T YOU HEAR":
PRINT@262,"THE CAPTAIN SHOUTING"
:PLAY"L2.DL4EFEFDL1CL2F"
1040 PRINT@230,"      'OH, DINAH"
:PRINT@262,"  BLOW YOUR HORN.'"
:SCREEN0,1:PLAY"GAB-AGL1FL2F"
1050 GOSUB1220
1060 CLS:PRINT@165,"AMERICA, THE
 BEAUTIFUL":PRINT@258,"WORDS BY
KATHARINE LEE BATES":PRINT@293,"
MUSIC BY SAMUEL A. WARD":SCREEN0
,1
1070 GOSUB1220
1080 CLS3:FORB=34 TO 450 STEP20:
PRINT@B,"AMERICA!";:NEXT:SCREEN0
,1:PLAY"L2GO3L2.EL4EL2DCL2.CO2L4
BL2B"
1090 GOSUB1220
1100 GOSUB1240
1110 PRINT@224," O BEAUTIFUL FOR
 SPACIOUS SKIES     FOR AMBER WA
VES OF GRAIN,":PLAY"T4O2L2GL2.GL
4EL2EGL2.GL4DL2DEFGABL1GL2G"
1120 PRINT@224,"  FOR PURPLE MOU
NTAIN MAJESTIES      ABOVE THE F
RUITED PLAIN!":PLAY"L2GL2.GL4EL2
EGL2.GL4DL2DO3DC#DEO2AO3L1DL2D"
1130 PRINT@224,"        AMERICA!
 AMERICA!          GOD SHED HIS 
GRACE ON THEE,":PLAY"O2L2GO3L2.E
L4EL2DCL2.CO2L4BL2BO3CDO2BAGO3L1
CL2C"
1140 PRINT@224,"       AND CROWN
 THY GOOD               WITH BRO
THERHOOD":PLAY"CL2.CO2L4AL2AO3L2
CL2.CO2L4GL2G"
1150 PRINT@224,"":PRINT@261,"FRO
M SEA TO SHINING SEA.":SCREEN0,1
:PLAY"GAO3CO2GO3DL1CL2C"
1160 GOSUB1220
1170 CLS6:FOR B=65 TO 74:PRINT@B
,"THAT'S";:NEXT B
1180 FOR B=166TO169:PRINT@B,"ALL
";:NEXT B
1190 FOR B=269TO278:PRINT@B,"FOL
KS"CHR$(33);:NEXT:SCREEN0,1:PLAY
"T255ABCDEFGABCDEFGABCDEFGABC"
1200 FOR B=396 TO 404:PRINT@B,CH
R$(33)"THE"CHR$(223)"END"CHR$(33
);:NEXT:SCREEN0,1
1210 GOTO1210
1220 FOR X=1 TO 3000:NEXT
1230 RETURN
1240 CLSRND(8):PRINT@224,STRING$
(34," ")
1250 RETURN
```

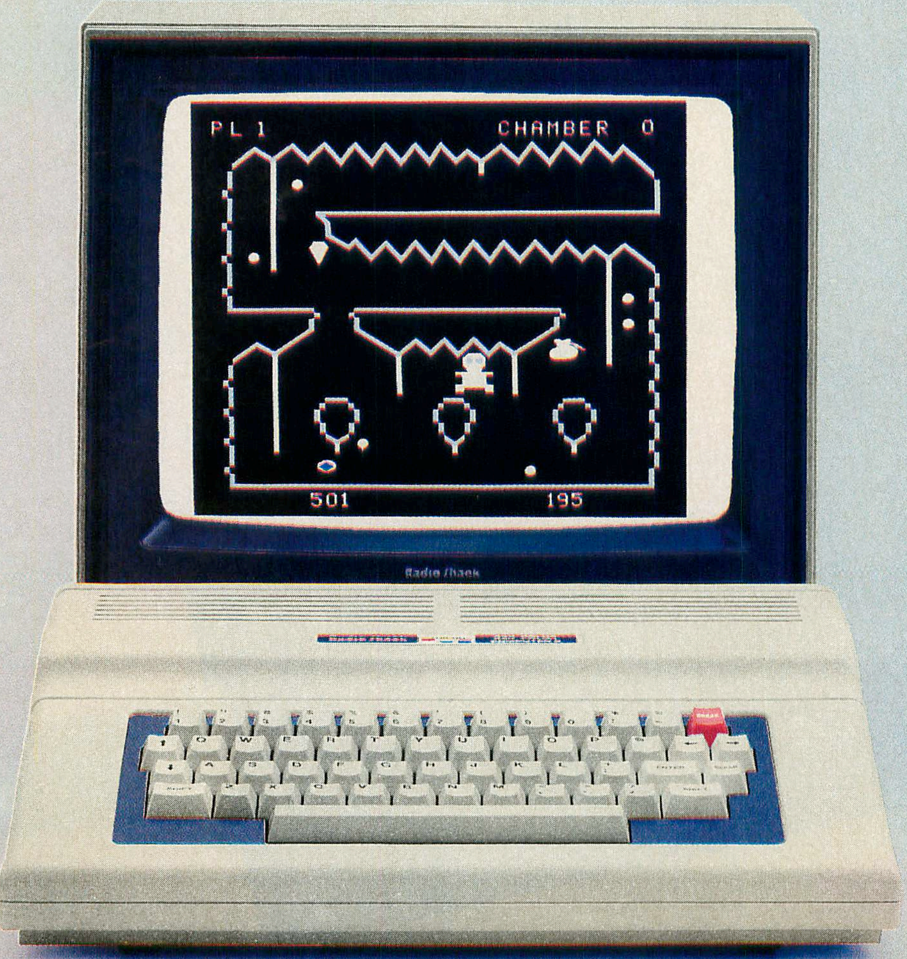
Radio Shack's Color Computer 2®

SAVE ON OUR BEST!

64K Memory! Extended BASIC! Cut $20...new low price $199.95

The Color Computer 2 is an affordable computer that allows you to write programs tailored to your personal and household needs. It's ideal for small-business and professional uses alike. With the built-in Extended BASIC language, you can access 32,000 characters of memory. To access the full 64K memory, simply add a disk drive and the optional OS-9 disk operating system.

The powerful Color Computer 2 (26-3127, was 219.95 in Cat. RSC-15) creates detailed color graphics from simple, one-line commands, and is ideal for drawings, designs, charts, engineering diagrams and even animation!



Ready-to-run software can help you set up personal and household budgets, create a household inventory, keep track of your investments, write letters and reports and record recipes.

With a wide range of educational software available, your children can use the Color Computer 2 to help strengthen their math, spelling and reading skills. The family can even play exciting computer games. The system attaches to any TV and is easily expanded.

Get the Color Computer 2 and your family will immediately start to enjoy the advantages of home computing . . . together!

Radio Shack®
The Technology Store™
A DIVISION OF TANDY CORPORATION

Send me a new 1986 computer catalog

Mail To: Radio Shack, Dept. 86-A-906
300 One Tandy Center, Fort Worth, Texas 76102

Name ____________________
Company ____________________
Address ____________________
City ____________________
State ____________ ZIP ________
Telephone ____________________

TV not included. Price applies at Radio Shack Computer Centers and at participating Radio Shack stores and dealers.

I Want My CoCo TV

By Becky and David Matthews

CoCoTV is no longer a distant dream. CoCoTV is here today! Watch the graphics video generated by the program while you listen to the original song recording of "Shadow of the Rings" on this month's RAINBOW ON TAPE. Your usually mild-mannered computer turns into CoCoTV with a music video of its very own. Follow the loading instructions and you'll want your CoCoTV, too.

The speed-up `POKE` is used in Line 40. This program uses many timing loops and can work without the speed-up `POKE`, but it will not be synchronized with the music.

Before loading the program, type `PCLEAR 8` to free two Hi-Res graphics screens, then `CLOAD "SHADOW"` and run. The program first prompts for a color test (lines 50 through 80). Follow the instructions on the screen. Next is the cassette test (lines 90 through 110).

The Play button on the recorder should be pressed and the TV volume should be up (if it is, you hear sound effects during the two tests). When `ENTER` is pressed (for "yes" to the cassette test), the cassette is started (Line 170) and the countdown begins. Line 190 displays the countdown from eight to one. Welcome to CoCoTV!

Shadow uses its own built-in alphabet to display words on Hi-Res graphics screens. In Line 150 the array for 26 letters is dimensioned — `DIML$(26)`. Subroutine 2230 has the `DRAW` substrings to draw each letter. The letters are used in lines 2590 through 2770 of the title page subroutine to write "Shadow of the Rings" on the title page screen and in lines 620 through 1970 to display the lyrics of the song bridge.

Note in Line 2590 and Line 620, `S4` has been specified to define the size of the `DRAW` commands. Changing `S4` to `S2` makes the letters half their original size. Similarly, `S6` makes them twice as large. The only other information needed to use this alphabet is the X,Y coordinates (where to start drawing the letter) and which letter to draw. L$(1) is the letter 'A', L$(2) is 'B', L$(3) is 'C', and so on.

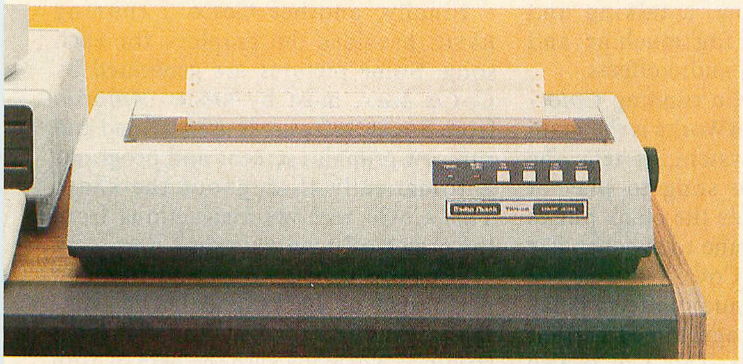
Using Line 2600 as an example, 54 is the 'X' position, 66 is the 'Y' position and L$(8) is the letter 'H'. See the letters subroutine (lines 2230 through 2460) for easy reference to which letter is which element of the L$ array. Letters 'L', 'Q', 'X' and 'Z' are not defined in the letters subroutine. Every letter except 'I' is 20 steps across and 28 steps up and down.

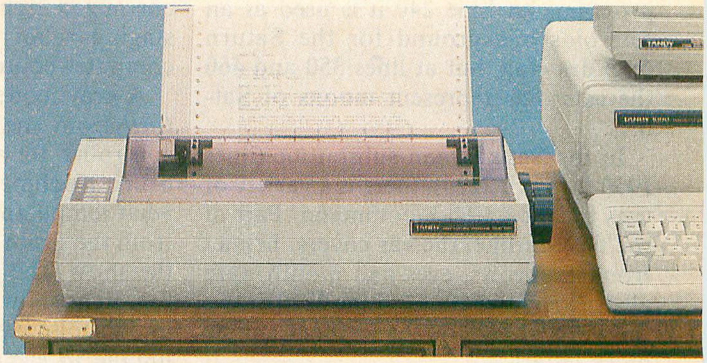
Knowing this, you can finish the alphabet. Starting with an easy letter, write your own 'L' `DRAW` substring, which is L$(12). Add it to the program as Line 2345. Now try adding the letter 'Q', L$(17) at Line 2385. For hints, look at Line 2370, which draws the letter 'O'. Continue and add 'X', L$(24), Line 2445 and 'Z', L$(26), Line 2455, and you have

---

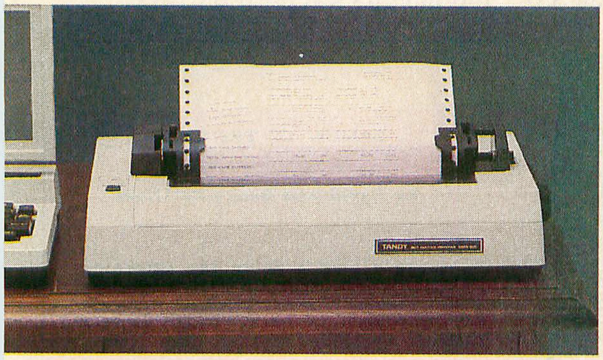
Becky and David Matthews freelance in electronics, computers and music. When they perform live music (with their robot face sidekick), they are known as Adobe Pagoda.

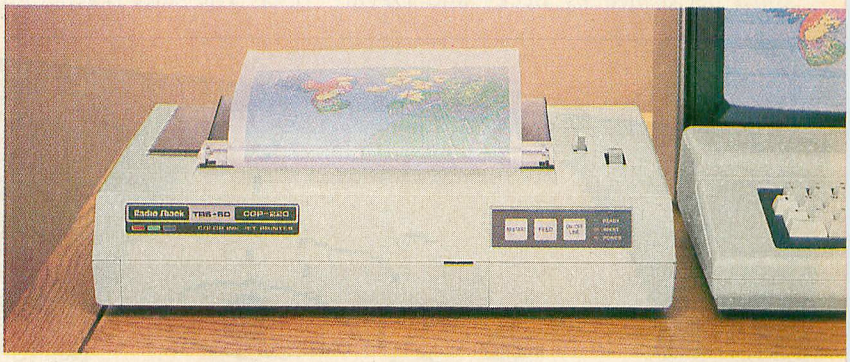
Next to your computer,





nothing beats a Tandy® printer.





Tandy printers make fine print quality, graphics and high performance affordable.

For your best value and selection in top-quality printers, shop your local Radio Shack Computer Center. We've got what you need, whatever your printing requirements.

Versatile Business Printer

The DMP 430* (26-1277, $899) is a 132-column dot-matrix printer with an 18-wire print head that delivers superior correspondence characters. Choose from micro, italic and double-high fonts, as well as bit-image graphics. In the draft mode, the DMP 430 delivers a fast 180 characters per second.

Low-Cost, Triple-Mode Personal Printer

The DMP 130* (26-1280, $349.95) lets you choose from word processing, data processing and dot-addressable graphics. Prints in four character styles: standard or italic cursive in draft or correspondence modes.

Budget-Priced High Performer

The DMP 105 (26-1276, $199.95) is ideal for data processing and general-purpose use. Features a bit-image graphics mode, too.

High-Resolution Ink-Jet Printer

The CGP 220 (26-1268, $599) quietly prints text and graphics in yellow, violet, red, green, cyan, magenta and black! And because there's no ribbon to wear out or become contaminated, the print quality remains excellent.

See the complete selection of printers and accessories at Radio Shack today.

Radio Shack®
The Technology Store™
A DIVISION OF TANDY CORPORATION

Free 1986 computer catalog! Send me a copy.

Mail To: Radio Shack
Dept. 86-A-906A
300 One Tandy Center
Fort Worth, Texas 76102

Name ____________________
Company ____________________
Address ____________________
City ____________________
State ____________________
ZIP ____________________
Phone ____________________

Prices apply at Radio Shack Computer Centers and at participating stores and dealers. DMP 430 requires special order at some locations. *IBM Compatible.
IBM/Registered TM International Business Machines Corp.

a complete alphabet — a new font of letters to use on the graphics screens.

The asteroids subroutine (starting at Line 2530) is called several times in the program. At Line 240 it is used as an asteroids background for the Saturn man drawing, but at lines 350 and 460 the asteroids represent moons of Saturn.

In the Saturn man subroutine (lines 1990 through 2220), there is a variety of uses for the `CIRCLE` command. Part of the face outline, the ear covers, helmet front, eyebrows, eyes and mouth were all drawn with `CIRCLE`. Line 2210 draws the word TITAN on the screen in simple block letters.

All drawings of Saturn are done with `CIRCLE`. The routines that shimmer the rings also use `CIRCLE`, but vary the color (variable C) and the step (variable V). See the Medium Saturn, Large Saturn and Big Rings subroutines.

About the Musical Group

"Adobe Pagoda" is a live musical show performed by Becky and David Matthews using three CoCos to provide multimedia excitement. The show includes CoCo graphics displayed on a large-screen TV, a 12-channel synchronized light show, a talking and singing robot face, fog machine and computer-controlled audio effects.

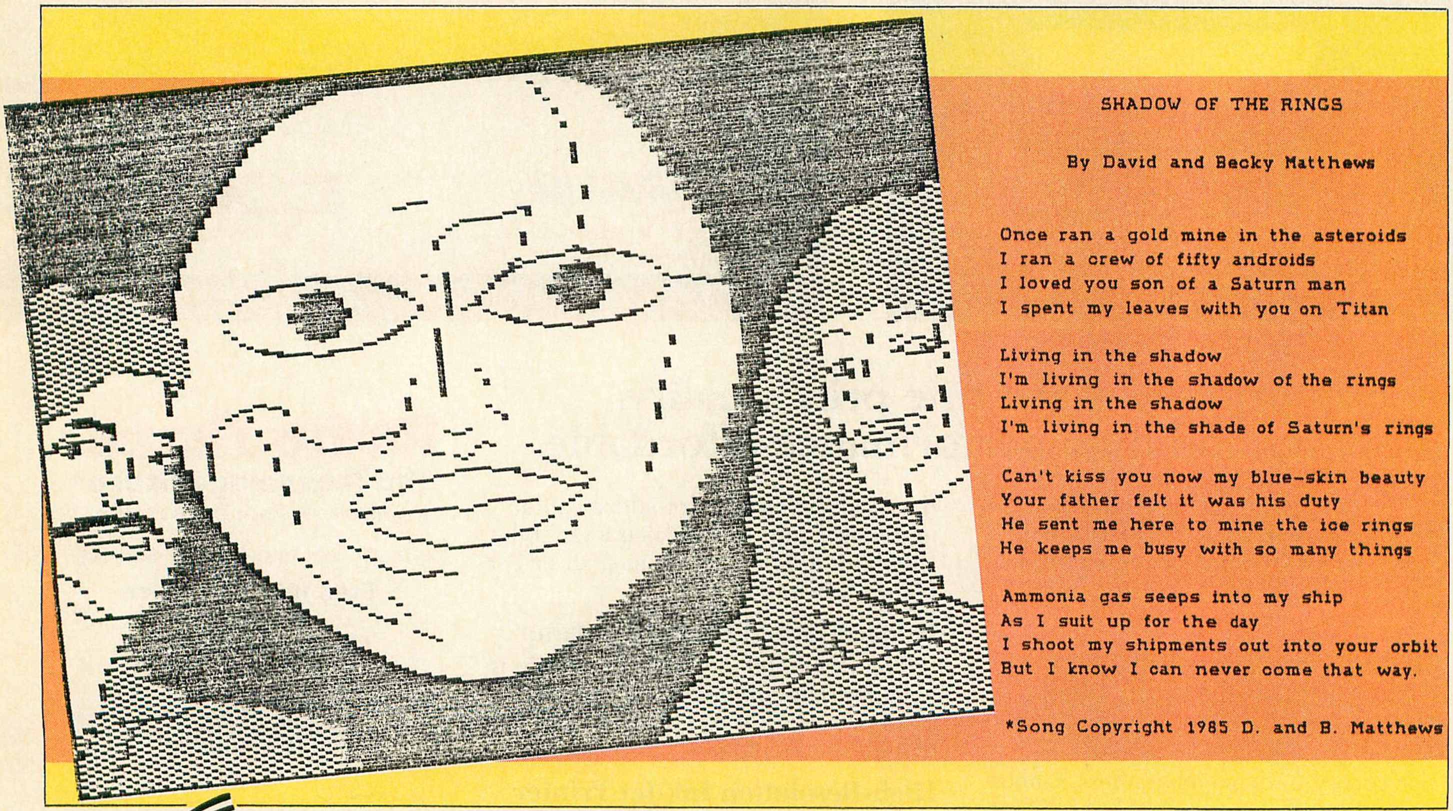
A gray model CoCo running *Colorforth* from The MicroWorks is the main controller for the system. It tells the drum machine what song to play at what tempo and reads the clock pulses from the drum machine to synchronize the show. The gray CoCo controls the fog, light show and audio effects delay line to follow pre-programmed actions unique to each song. This CoCo also sends synchronizing triggers to the CoCo used for graphics, and control signals to the CoCo used for the robot face and voice. The gray CoCo uses five PIAs for I/O.

A CoCo 2 running *Colorforth* from Armadillo International Software controls the robot face with lights for the eyes and mouth synchronized to the voice. The voice is generated by an SSI 263 voice chip. This CoCo receives numerical data that tells it what speech/sound effect routine to perform via the RS-232 port from the gray CoCo.

Finally, another CoCo 2 running BASIC provides the graphics for each song. Some pictures are generated by *CoCo Max*, most by BASIC. *Autorun* from Sugar Software is used to load and run new graphics screens and programs automatically throughout the show. This CoCo receives instructions from the gray CoCo via a joystick port.

"Shadow of the Rings," written and performed by Becky and David Matthews, was recorded at Sound Vortex studio in Nashville with the help of Tom Steinman and Rob Earls. For a cassette of two additional original song recordings with an accompanying graphics program, send $10 to 2415 Smith Springs Road, Nashville, TN 37217. ☐

Editor's Note: The musical recording of "Shadow of the Rings" will immediately follow the *Shadow* program listing on this month's RAINBOW ON TAPE.



SHADOW OF THE RINGS

By David and Becky Matthews

Once ran a gold mine in the asteroids
I ran a crew of fifty androids
I loved you son of a Saturn man
I spent my leaves with you on Titan

Living in the shadow
I'm living in the shadow of the rings
Living in the shadow
I'm living in the shade of Saturn's rings

Can't kiss you now my blue-skin beauty
Your father felt it was his duty
He sent me here to mine the ice rings
He keeps me busy with so many things

Ammonia gas seeps into my ship
As I suit up for the day
I shoot my shipments out into your orbit
But I know I can never come that way.

*Song Copyright 1985 D. and B. Matthews

190	12	2180	158
440	11	2330	196
640	239	2470	158
950	80	2660	49
1230	173	2820	237
1550	0	2910	92
1830	218	END	19
2060	116		

The listing: `SHADOW`

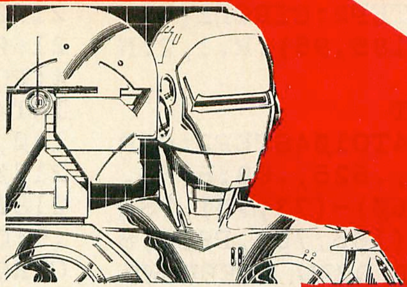
```
10 '****"SHADOW" BY B. MATTHEWS
20 '**SONG "SHADOW OF THE RINGS"
 COPYRIGHT 1983 D. & B. MATTHEWS
30 'SPEED-UP POKE
40 POKE65495,0
```

```
50 'COLOR TEST
60 A$=INKEY$:CLS0:PRINT"RED?
   PRESS ENTER.";:PRINT@64,"BLUE
?     STOP CASSETTE, BREAK, RES
ET AND RUN.";:FORT=1TO150:NEXTT
70 PMODE4:PCLS:SCREEN1,1:PMODE3:
PCLS6:PLAY"O2T255CDEFGABC"
80 IFA$<>CHR$(13)THEN60
90 'CASSETTE TEST
100 CLS7:PRINT"CASSETTE ON PLAY?
  VOLUME UP?    (ENTER FOR YES)"
;
110 PLAY"O1T255BAGFEDC":A$=INKEY
$:IFA$<>CHR$(13)THEN110
120 'SET COLORS
130 M=2:W=3:Q=2:U=1:E=0
140 'LETTERS
150 DIML$(26):GOSUB2230
160 'START CASSETTE
170 MOTOR ON:AUDIO ON
180 'COUNT-OFF
190 C=3:FORN=8TO1STEP-1:CLSC:PRI
NT@238,N;:FORT=1TO600:NEXTT:C=C+
1:IFC>8THENC=3
200 NEXTN
210 'GOSUB TITLE PAGE
220 GOSUB2570
230 'GOSUB ASTEROIDS
240 PMODE4,5:PCLS0:SCREEN1,1:GOS
UB2530:FORT=1TO3000:NEXTT
250 'GOSUB SATURN MAN
260 FORP=1TO4:PCOPYP+4TOP:NEXTP:
GOSUB1990
270 FORT=1TO2300:NEXTT
280 'GOSUB MEDIUM SATURN
290 GOSUB2820
300 'GOSUB BIG RINGS
310 GOSUB2470
320 'GOSUB AMMONIA
330 PMODE4,1:PCLS1:SCREEN1,1:COL
OR0,1:GOSUB610
340 'GOSUB ASTEROIDS(MOONS)
350 PMODE4,5:PCLS:SCREEN1,1:GOSU
B2530
360 'GOSUB LARGE SATURN
370 GOSUB2900
380 FORT=1TO1000:NEXTT
390 'GOSUB SATURN MAN
400 PMODE4,1:PCLS:E=1:GOSUB1990
410 'FLICKER
420 FORT=1TO990:PMODE4,5:SCREEN1
,0:PMODE4,1:SCREEN1,1:NEXTT
430 'GOSUB AMMONIA
440 PMODE4,1:PCLS1:SCREEN1,1:COL
OR0,1:GOSUB610
450 'GOSUB ASTEROIDS (MOONS)
460 PMODE4,5:PCLS:SCREEN1,1:PCLS
0:GOSUB2530
470 'GOSUB STARS
480 GOSUB2980
490 'GOSUB MEDIUM SATURN
500 GOSUB2820
510 FORT=1TO1000:NEXTT
520 'GOSUB TITLE PAGE
530 GOSUB2570
540 'FLICKER
550 FORP=1TO500:PMODE3,1:SCREEN1
,1:SCREEN1,0:PMODE4,1:SCREEN1,1:
NEXTP
560 'STOP CASSETTE
570 MOTOR OFF:AUDIO OFF:POKE6549
4,0
580 'CREDITS
590 CLS3:PRINT@103,"SHADOW OF TH
E RINGS";:PRINT@233,"BY B. MATTH
EWS";:PRINT@457,"SONG COPYRIGHT"
;:PRINT@485,"1983 D. AND B. MATT
HEWS";:FORT=1TO7000:NEXTT:CLS0
600 END
610 '*AMMONIA SUB- WRITE AMMONIA
620 DRAW"BM44,30S4"+L$(1)
630 DRAW"BM64,30"+L$(13)
640 DRAW"BM94,30"+L$(13)
650 DRAW"BM124,30"+L$(15)
660 DRAW"BM150,30"+L$(14)
670 DRAW"BM176,30"+L$(9)
680 DRAW"BM200,30"+L$(1)
690 'GAS
700 DRAW"BM12,70"+L$(7)
710 DRAW"BM44,70"+L$(1)
720 DRAW"BM64,70"+L$(19)
730 'SEEPS
740 DRAW"BM114,70"+L$(19)
750 DRAW"BM140,70"+L$(5)
760 DRAW"BM166,70"+L$(5)
770 DRAW"BM192,70"+L$(16)
780 DRAW"BM218,70"+L$(19)
790 'INTO
800 DRAW"BM76,110"+L$(9)
810 DRAW"BM94,110"+L$(14)
820 DRAW"BM120,110"+L$(20)
830 DRAW"BM146,110"+L$(15)
840 'MY
850 DRAW"BM36,150"+L$(13)
860 DRAW"BM66,150"+L$(25)
870 'SHIP
880 DRAW"BM114,150"+L$(19)
890 DRAW"BM140,150"+L$(8)
```

```
900 DRAW"BM166,150"+L$(9)
910 DRAW"BM184,150"+L$(16)
920 FORT=1TO3800:NEXTT:PCLS1
930 'AS
940 DRAW"BM76,30"+L$(1)
950 DRAW"BM96,30"+L$(19)
960 'I
970 DRAW"BM152,30"+L$(9)
980 'SUIT
990 DRAW"BM40,70"+L$(19)
1000 DRAW"BM66,70"+L$(21)
1010 DRAW"BM92,70"+L$(9)
1020 DRAW"BM110,70"+L$(20)
1030 'UP
1040 DRAW"BM162,70"+L$(21)
1050 DRAW"BM188,70"+L$(16)
1060 'FOR
1070 DRAW"BM36,110"+L$(6)
1080 DRAW"BM62,110"+L$(15)
1090 DRAW"BM88,110"+L$(18)
1100 'THE
1110 DRAW"BM142,110"+L$(20)
1120 DRAW"BM168,110"+L$(8)
1130 DRAW"BM194,110"+L$(5)
1140 'DAY
1150 DRAW"BM84,150"+L$(4)
1160 DRAW"BM116,150"+L$(1)
1170 DRAW"BM136,150"+L$(25)
1180 FORT=1TO3700:NEXTT:PCLS1
1190 'I
1200 DRAW"BM110,0"+L$(9)
1210 'SHOOT
1220 DRAW"BM22,32"+L$(19)
1230 DRAW"BM48,32"+L$(8)
1240 DRAW"BM74,32"+L$(15)
1250 DRAW"BM100,32"+L$(15)
1260 DRAW"BM126,32"+L$(20)
1270 'MY
1280 DRAW"BM174,32"+L$(13)
1290 DRAW"BM204,32"+L$(25)
1300 'SHIPMENTS
1310 DRAW"BM8,64"+L$(19)
1320 DRAW"BM34,64"+L$(8)
1330 DRAW"BM60,64"+L$(9)
1340 DRAW"BM78,64"+L$(16)
1350 DRAW"BM104,64"+L$(13)
1360 DRAW"BM134,64"+L$(5)
1370 DRAW"BM160,64"+L$(14)
1380 DRAW"BM186,64"+L$(20)
1390 DRAW"BM212,64"+L$(19)
1400 'OUT
1410 DRAW"BM20,96"+L$(15)
1420 DRAW"BM46,96"+L$(21)
1430 DRAW"BM72,96"+L$(20)
1440 'INTO
1450 DRAW"BM120,96"+L$(9)
1460 DRAW"BM138,96"+L$(14)
1470 DRAW"BM164,96"+L$(20)
1480 DRAW"BM190,96"+L$(15)
```

```
1490 'YOUR
1500 DRAW"BM60,128"+L$(25)
1510 DRAW"BM86,128"+L$(15)
1520 DRAW"BM112,128"+L$(21)
1530 DRAW"BM138,128"+L$(18)
1540 'ORBIT
1550 DRAW"BM52,160"+L$(15)
1560 DRAW"BM78,160"+L$(18)
1570 DRAW"BM104,160"+L$(2)
1580 DRAW"BM130,160"+L$(9)
1590 DRAW"BM148,160"+L$(20)
1600 FORT=1TO3400:NEXTT:PCLS1
1610 'BUT
1620 DRAW"BM86,10"+L$(2)
1630 DRAW"BM112,10"+L$(21)
1640 DRAW"BM138,10"+L$(20)
1650 'I
1660 DRAW"BM24,44"+L$(9)
1670 'KNOW
1680 DRAW"BM66,44"+L$(11)
1690 DRAW"BM92,44"+L$(14)
1700 DRAW"BM118,44"+L$(15)
1710 DRAW"BM144,44"+L$(23)
1720 'I
1730 DRAW"BM196,44"+L$(9)
1740 'CAN
1750 DRAW"BM4,78"+L$(3)
1760 DRAW"BM36,78"+L$(1)
1770 DRAW"BM56,78"+L$(14)
1780 'NEVER
1790 DRAW"BM110,78"+L$(14)
1800 DRAW"BM136,78"+L$(5)
1810 DRAW"BM162,78"+L$(22)
1820 DRAW"BM188,78"+L$(5)
1830 DRAW"BM214,78"+L$(18)
1840 'COME
1850 DRAW"BM4,112"+L$(3)
1860 DRAW"BM30,112"+L$(15)
1870 DRAW"BM56,112"+L$(13)
1880 DRAW"BM86,112"+L$(5)
1890 'THAT
1900 DRAW"BM136,112"+L$(20)
1910 DRAW"BM162,112"+L$(8)
1920 DRAW"BM194,112"+L$(1)
1930 DRAW"BM214,112"+L$(20)
1940 'WAY
1950 DRAW"BM86,146"+L$(23)
1960 DRAW"BM118,146"+L$(1)
1970 DRAW"BM138,146"+L$(25)
1980 FORT=1TO4000:NEXTT:RETURN
1990 '*SATURN MAN SUB- DRAW FACE
2000 'OUTLINE FACE
2010 PMODE4,1:SCREEN1,1:COLOR1,0
:DRAW"BM180,97C1S6M164,138G15L20
H15M78,97BM125,154R4"
2020 CIRCLE(129,70),70,1,.92,.37
,.99:CIRCLE(129,70),70,1,.92,0,.
15
2030 'EAR COVERS
```

Robot Odyssey I



Adventure game or advanced education? You decide! **Robot Odyssey I** is divided into 3 parts: a **tutorial** that teaches the basics of robot anatomy and circuit design; the **lab**, where you practice building robots to perform specific tasks; and the **game**, an adventure that challenges you to escape from Robotropolis.

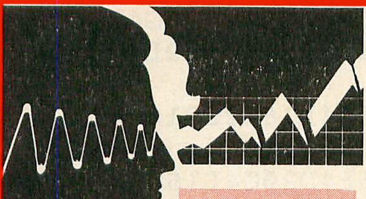
Robotropolis is an underground city inhabited by both friendly and bothersome robots. It is built in five levels, so your escape must be achieved in five increasingly more difficult stages. First is the sewer where friendly robots aid your escape. In the next level, the subway, you must rewire a robot. At the fourth level you get to the master control center. Finally, you reach the skyways. Less than 5% ever solve the last level!

Each robot has one eye, a grabber, an antenna to send and receive signals, four thrusters for guidance, four bumpers that detect walls, and a rechargable battery. You must learn to operate these robots, including modifying and designing their inner circuitry, to escape from Robotropolis.

In addition to having great fun and adventure, you will learn a great deal about the inside of robots, integrated circuitry, and logic. **Robot Odyssey I** is the ultimate puzzle, requiring much time and effort while providing big rewards in return! **Requires 64K, Disk $34.95**

Free Catalog!

Please call or write for our ***free CoCo catalog*** *with* ***32 pages*** *of articles, software, hardware, and coupons!*



Bio Detector

Biofeedback and Lie Detector Game

Learn the art of relaxation through biofeedback - or use the same device for party fun as a lie detector game. Software for both is included. The Bio Detector works through silver finger sensors attached to the Bio Detector unit which plugs into the joystick port. Your galvanic skin response is plotted in hires color graphics and sound. Learn stress reduction easily by watching your responses on the screen. The Anxiety Attack Game will provide hours of embarrassing and truthful fun as well. All hardware, software, and instructions are included. **Requires 16K $24.95**

Advanced OS-9 Utilities

by Brian Lantz

KSHELL allows wildcard with any utility! Includes PATH for multiple path directories, UNLOAD for repetitive unlinks, FLINK for alternative boot files, ARCHIVE to backup large media to small media, & CPY.

Serious OS-9 users cannot do without this set of utilities! **Requires 64K, OS-9 $29.95**

Disk Fix & OS-9 Utilities

by Harry Hardy

Unleash the real power of OS-9! **DISK FIX** supports true double-sided, double-density, 40 or 80 tracks, and step rates up to 6 ms - and each drive is configured separately! (CCDISK included)

DMODE allows super easy modification of drive descriptors. DIRCOPY is a powerful copy utility. PATCH lets you inspect & modify a disk file. FILELOOK displays file modules without loading. COMPARE compares a file to memory.

Includes modules for **1.X and 2.X** OS-9! **Requires 64K, OS-9 $34.95**

The Last Word

by Michael Bailey

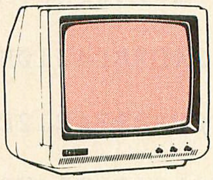
Computerware is proud to represent The Last Word by Michael Bailey of United Software. We chose The Last Word because it is truly the ultimate OS-9 word processor!

The Last Word offers fast, on-screen formatting using your choice of mouse, joystick or keyboard. The popdown menu is accessible at all times while inputting text so it is very easy to use. The Last Word provides the capability to move, insert or delete blocks of text, paragraphs, lines, or characters with just a click of the mouse or joystick or the touch of a key.

The Last Word is compatible with Word-Pak or you can use its own hires 51x24 display. You open files just by pointing to names on a directory menu. Once the file is open, you can move freely within the file from top to bottom and back again. If using it with Word-Pak, you have a 22,000 word dictionary on-line at your fingertips!

You can easily imbed your printer's special codes in your files. With more than 30 screen editing commands available, it's simple to format or reformat as necessary. Change the margins, double or single space, etc. using the pop-down menus. The Last Word is very easy to use and learn. It will be a staple in your OS-9 library! **Requires 64K, OS-9 $49.95**

Monitors



NAP Monochrome Monitors
The 20 mhz band width, 800 line resolution, and 80 x 25 display insure a crisp picture. Plus—it has audio input.
Green 12″ Amber 12″ **$114.95 plus $5 shipping**

SAKATA Color Monitor
Beautiful 13″ color display with 280 x 300 line resolution. Includes composite video color and audio.
$175 plus $15 shipping

Put a Monitor on Your CoCo with the Universal Video Plus

Our advanced design gives the **highest quality display.**

Installation is easy. There is no soldering and no dismantling of the RF shield.

The Universal Video Plus works with **every CoCo.** Easy-to-follow, **clear instructions** are included.

Heavy duty construction, evidenced by sturdy leads and connectors.

All cables (audio & video) are included. No need to buy extenders or extra cables as required by other drivers.

Shielded audio & video cables insure that no extra RF interference is introduced from the Universal Video Plus, unlike other interfaces.

Universal Video Plus $34.95

Call or Write to: **(619) 436-3512**

COMPUTERWARE®
Box 668,
Encinitas, CA 92024

Name ______
Address ______
City ______ State ______ Zip ______
Yes! Send me your FREE catalog! CoCo ☐
VISA MasterCard
Card # ______ Exp. ______
Signature ______

Item	Format	Price

Shipping 6% Calif Sales Tax ______
Surface — $2 minimum. COD Add $5 ______
2% for orders over $100 Shipping* ______
Air or Canada — $5 minimum. TOTAL ______
5% for orders over $100
Checks are delayed for bank clearance

```
2040 FOR R=1TO11STEP2:CIRCLE(71,
95),R,1,2:CIRCLE(185,95),R,1,2:N
EXTR
2050 'HELMET FRONT
2060 H=.60:FORY=94TO104STEP2:CIR
CLE(129,Y),80,1,H,.625,.88:H=H+.
05:NEXTY:LINE(72,60)-(73,75),PSE
T,B:LINE(184,60)-(185,75),PSET,B
2070 'PAINT HELMET,DRAW EYEBROWS
2080 DRAW"BM199,66S4C1D4":POKE17
8,145:PAINT(140,30),,1
2090 FORY=73TO77STEP2:CIRCLE(152
,Y),15,1,.6,.62,.95:CIRCLE(104,Y
),15,1,.6,.55,.9:NEXTY
2100 'EYES
2110 CIRCLE(152,88),15,1,.8,.62,
.9:CIRCLE(104,88),15,1,.8,.6,.9:
CIRCLE(152,76),15,1,.8,.1,.41:CI
RCLE(104,76),15,1,.8,.1,.4
2120 PAINT(146,82),1,1:PAINT(100
,82),1,1:FOR R=1TO4STEP2:CIRCLE(
152,82),R,0:CIRCLE(104,82),R,0:N
EXT R
2130 'NOSE AND MUSTACHE
2140 DRAW"BM125,86C1S8D2M120,116
F1R2BR2R1BD1L2G1H1L2G1L2G1L2G3R3
E1R1M125,126M135,128R2E1R1E4L3G2
L2H1L2BM157,114C1S4F2D2"
2150 'MOUTH AND PAINT FACE
2160 CIRCLE(126,122),20,1,.5,1,.
4:POKE178,U:PAINT(128,128),,1:PA
INT(128,130),,1:POKE178,Q:PAINT(
140,80),,1
2170 'OUTLINE EYES
2180 CIRCLE(152,88),15,0,.8,.62,
.9:CIRCLE(104,88),15,0,.8,.6,.9:
CIRCLE(152,76),15,0,.8,.1,.41:CI
RCLE(104,76),15,0,.8,.1,.4:IFE=1
THENRETURN
2190 FORT=1TO2000:NEXTT
2200 'WRITE "TITAN"
2210 DRAW"BM12,148C1S2R8ND16R8BR
8D16BR16U16NL8R8BR8G8NR14D8BR16U
8H8BR16ND16F12ND4U12BF8BR4R18NG6
H6"
2220 RETURN
2230 '*LETTERS SUBROUTINE
2240 L$(1)="R10F4D24L4U12L12D12L
4U24E4BD4BR4R4F4D4L12U4E4":'A
2250 L$(2)="R16F4D6G4F4D6G4L16U2
8BF4R10F2D3G3L4D4R4F3D3G2L10U20"
:'B
2260 L$(3)="R20D4L16D20R16D4L20U
28":'C
2270 L$(4)="R16F4D20G4L16U28BF4R
10F2D16G2L10U20":'D
2280 L$(5)="R20D4L16D8R12D4L12D8
R16D4L20U28":'E
2290 L$(6)="R20D4L16D8R12D4L12D1
2L4U28":'F
2300 L$(7)="R20D8L4U4L12D20R12U6
L4U4R8D14L20U28":'G
2310 L$(8)="R4D12R12U12R4D28L4U1
2L12D12L4U28":'H
2320 L$(9)="R12D4L4D20R4D4L12U4R
4U20L4U4":'I
2330 L$(10)="R12D4L4D24L16U8R4D4
R8U20L4U4":'J
2340 L$(11)="R4D12E10U2R6D2G12F1
2D2L6U2H10D12L4U28":'K
2350 L$(13)="R4F8E8R4D28L4U22G8H
8D22L4U28":'M
2360 L$(14)="R4F12U12R4D28L4U10H
12D22L4U28":'N
2370 L$(15)="R20D28L20U28BF4R12D
20L12U20":'O
2380 L$(16)="R16F4D8G4L12D12L4U2
8BF4R10F2D4G2L10U8":'P
2390 L$(18)="R20D16L10F10D2L6U2H
10D12L4U28BF4R12D8L12U8":'R
2400 L$(19)="R20D8L4U4L12D8R16D1
6L20U8R4D4R12U8L16U16":'S
2410 L$(20)="R20D4L8D24L4U24L8U4
":'T
2420 L$(21)="R4D24R12U24R4D28L20
U28":'U
2430 L$(22)="R4D16F6E6U16R4D18G1
```

64K CoCo Users!

IMAGINE A DOS THAT

- ► Is Configured for YOUR System
  Allows up to 54K of Workspace
- ► Handles 40 & 80 Track Drives
  & Double-sided Drives
- ► Simplifies Machine Language
  with 90 System Calls
- ► Automatically Dates Files

HELP IS HERE WITH

SOS

►► small (8K) operating system

PROGRAM DISK (including FORMAT BACKUP & COPY UTILITIES) with detailed USER'S MANUAL and 1 PATCH of your choice $49.95 plus $3.00 s/h add'l PATCHES $9.95 each
N.J. residents add 6% sales tax

PATCHES AVAILABLE FOR
- ● MICROWORKS: Editor/Assembler Disassembler & DCBUG
- ● COMPUTERWARE: Editor & MacroAssembler
- ● DUGGER'S GROWING SYSTEMS: C (1.2 & 2.5)
- ● ELITE SOFTWARE: Elite WORD
- ● DOUBLE DENSITY: Clrterm (3.3 & 4.1)
- ● COGNITEC: Telewriter 64 (0 & 1)
- ● RADIO SHACK: EDTASM+ & SCRIPSIT (cartridges)

REVIEWED IN MAY, 1986
RAINBOW

RAINBOW
CERTIFICATION
SEAL

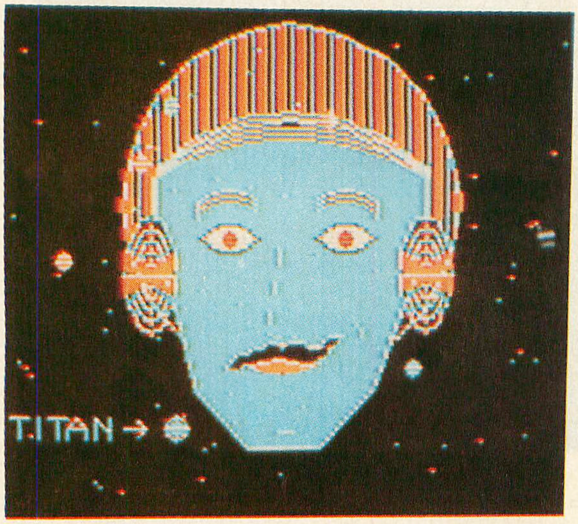
PROGRAMMER'S REFERENCE GUIDE & DISK UTILITIES ALSO AVAILABLE $22.95 each

SOISTMANN ENTERPRISES, INC.

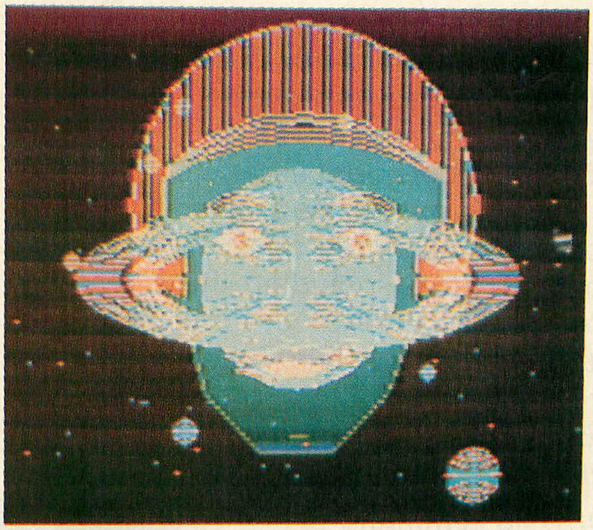
CALL OR WRITE: SOISTMANN ENTERPRISES, INC.
P.O. BOX 257
BUDD LAKE, N.J. 07828
(201) 347-0763

P.O. BOX 330
WEST BERLIN, N.J. 08091
(609) 768-4183

```
0H10U18":'V
2440 L$(23)="R4D22E6F6U22R4D28L4
H6G6L4U28":'W
2450 L$(25)="R4D6F6E6U6R4D8G8D12
L4U12H8U8":'Y
2460 RETURN
2470 '*BIG RINGS SUBROUTINE
2480 PMODE4,1:PCLS0:SCREEN1,1:CO
LOR7,6:FORS=1TO90:X=12+RND(233):
Y=12+RND(167):PSET(X,Y,7):NEXTS:
PMODE3,1:FORR=1TO30:CIRCLE(128,9
5),R,M,.9:NEXTR
2490 PMODE3,1:V=3:C=2:FORT=1TO21
:FORR=90TO55STEP-V:CIRCLE(128,95
),R,C,.95:NEXT R:C=C+1:IFC=>9THE
NC=1
```



```
2500 V=V+1
2510 NEXTT
2520 RETURN
2530 '*ASTEROIDS (MOONS) SUB
2540 PMODE4,5:PCLS:GOSUB2980:FOR
X=0TO6STEP2:LINE(X,0)-(X,192),PS
ET:LINE(X+248,0)-(X+248,192),PSE
T:NEXTX
2550 FORR=1TO3STEP2:CIRCLE(67,55
),R,1:CIRCLE(145,40),R,1:CIRCLE(
80,35),R,1:CIRCLE(180,130),R,1:C
IRCLE(35,90),R,1:NEXTR
2560 FORR=1TO6STEP2:CIRCLE(82,15
2),R,1:NEXTR:RETURN
2570 '*TITLE PAGE SUBROUTINE
2580 'SHADOW
2590 PMODE4,1:PCLS:SCREEN1,1:COL
OR1,0:DRAW"BM28,66S4"+L$(19)
2600 DRAW"BM54,66"+L$(8)
2610 DRAW"BM86,66"+L$(1)
2620 DRAW"BM106,66"+L$(4)
2630 DRAW"BM132,66"+L$(15)
2640 DRAW"BM158,66"+L$(23)
2650 'OF
2660 DRAW"BM48,102"+L$(15)
```



```
2670 DRAW"BM74,102"+L$(6)
2680 'THE
2690 DRAW"BM118,102"+L$(20)
2700 DRAW"BM144,102"+L$(8)
2710 DRAW"BM170,102"+L$(5)
2720 'RINGS
2730 DRAW"BM80,138"+L$(18)
2740 DRAW"BM106,138"+L$(9)
2750 DRAW"BM124,138"+L$(14)
2760 DRAW"BM150,138"+L$(7)
2770 DRAW"BM178,138"+L$(19)
2780 'DRAW SMALL SATURN
2790 COLOR1,0:FORX=1TO10STEP2:LI
NE(X,X)-(256-X,191-X),PSET,B:NEX
TX:X=198:Y=40
2800 FOR R=0TO19:CIRCLE(X,Y),R:N
EXTR:FORR=23TO35STEP3:CIRCLE(X,Y
),R,1,.27:NEXTR:GOSUB2980:IFE=1T
HENRETURN
2810 FORT=1TO75:PMODE3,1:SCREEN1
,0:FORR=1TO50:NEXTR:PMODE4,1:SCR
EEN1,1:FORR=1TO50:NEXTR:NEXTT:RE
TURN
2820 '*MEDIUM SATURN SUBROUTINE
2830 PMODE4,5:SCREEN1,1:X=126:Y=
90:FORR=0TO30:CIRCLE(X,Y),R:NEXT
```

The Crossword Creator Contest

Can you create a totally symmetrical crossword puzzle using the *Word+* program and the specifications outlined in the accompanying article on Page 38 of the May 1986 issue of THE RAINBOW? If so, you may wish to enter The Crossword Creator Contest. And, if we choose to print your crossword puzzle, you will be awarded a special prize.

Send us a disk or cassette copy of the data file of your puzzle created by *Word+* along with a printed copy of the crossword puzzle — including the clues and answers. Be sure to put a title on the puzzle and if possible, follow a general interest theme.

Entries will be judged on the following criteria:

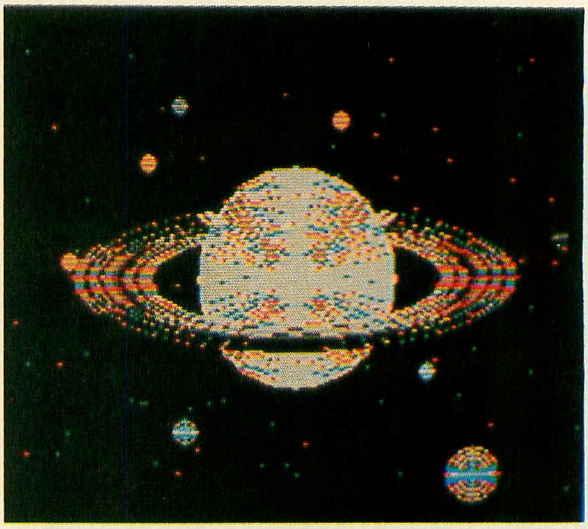
- Puzzle symmetry
- Number of words
- Spelling
- Creativity
- Thematic originality
- Understandability
- Ease of loading data
- Neatness
- Packaging

Enter as often as you like! Please note: We consider your act of entering the contest as consent to publish your creation.

The Crossword Creator Contest is open to all RAINBOW readers, advertisers and employees of Falsoft, Inc.

Send entries to:
Crossword Creator Contest
c/o THE RAINBOW
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

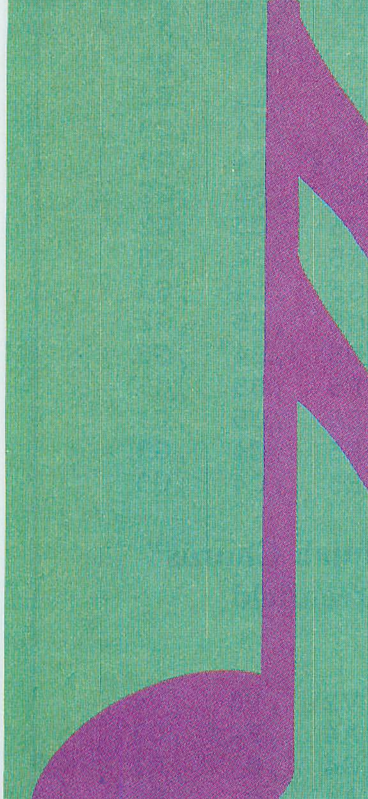
```
R
2840 FORR=40TO50STEP4:CIRCLE(X,Y
),R,1,0.25,0,.65:CIRCLE(X,Y),R,1
,0.25,.85,.99:NEXTR
2850 FORR=56TO62STEP4:CIRCLE(X,Y
),R,1,0.25,0,.69:CIRCLE(X,Y),R,1
,0.25,.81,.99:NEXTR
2860 V=2:C=1:FORT=1TO19:FORR=40T
O52STEPV:CIRCLE(X,Y),R,C,.25,0,.
624:CIRCLE(X,Y),R,C,.25,.875,.99
:NEXTR
2870 FOR R=56TO62STEPV:CIRCLE(X,
Y),R,C,.25,0,.67:CIRCLE(X,Y),R,C
,.25,.844,.99:NEXTR:V=V+1:C=C-1:
IFC=-1THENC=1
2880 IFV>5THENV=2
2890 NEXTT:RETURN
2900 '*LARGE SATURN SUBROUTINE
2910 PMODE4,5:COLOR1,0:SCREEN1,1
```



```
:X=127:Y=96:FORR=1TO11STEP2:CIRC
LE(200,170),R,1:NEXTR:FORR=1TO40
:CIRCLE(X,Y),R,1:NEXTR
2920 FORR=60TO70STEP3:CIRCLE(X,Y
),R,1,.3,0,.67:CIRCLE(X,Y),R,1,.
3,.845,.99:NEXTR:FORR=74TO90STEP
3:CIRCLE(X,Y),R,1,.3,0,.689:CIRC
LE(X,Y),R,1,.3,.815,.99:NEXTR
2930 V=2:C=1:FORT=1TO7:FOR R=60T
O70STEPV:CIRCLE(X,Y),R,C,.3,0,.6
4:CIRCLE(X,Y),R,C,0.3,.86,.99:NE
XTR
2940 FOR R=74TO90STEPV:CIRCLE(X,
Y),R,C,.3,0,.680:CIRCLE(X,Y),R,C
,.3,.831,.99:NEXTR:V=V+1:C=C-1:I
FC=-1THENC=1
2950 IFV>7THENV=2
2960 NEXTT:RETURN
2970 '*STARS SUBROUTINE
2980 FORS=1TO80:X=12+RND(233):Y=
12+RND(167):PSET(X,Y,5):NEXTS:RE
TURN
```

Music+: New Commands, No Bugs

By Bob Ludlum



Since *Music+* appeared in RAINBOW ("Making Four-Part Harmony Easier," June 1984, Page 74) I've received a large response from *Music+* users with questions and requests for additional features. As a result, I've fixed a minor bug and added two new commands to the program.

If you're not familiar with *Music+*, it's an enhanced version of Larry Konecky's *CoCo Composing* (RAINBOW, December 1983). It is a BASIC program that loads a machine language music synthesis program. A screen editor facilitates the entry, editing and playing of four-part music. It requires a 32K Color Computer with Extended BASIC and runs without modification on both tape and disk systems.

I want to answer some questions I received repeatedly. First, is it possible to add more voices and octaves? Yes, relatively simple modifications to the editor and synthesis programs are all that is required, but a tradeoff exists between the added complexity and the quality of the sounds produced.

Music+ synthesizes the music wave form by summing the contributions from the four voices at equally spaced time intervals. The result is a sampled approximation of the desired wave form. The accuracy of the approximation depends on how often the samples are calculated (the sampling rate). The theoretical minimum rate required is two samples per cycle of the highest frequency component in the wave form. In practice, much higher rates are needed.

If the sampling rate is too low, unwanted frequency components appear in the wave form, a phenomenon known as "aliasing." *Music+* calculates a new wave form sample every 145 microseconds (6,896 samples per second), which is already marginal.

The second question frequently asked was, "Why do I get a 'C' note when I enter a 'B' sharp and why do the notes jump from 'B' in one octave to 'C' in the next?"

The note table in *Music+* implements the equally tempered chromatic scale with a standard pitch of 440 Hertz (cycles per second) for 'A' in the fourth octave. Each octave begins with the note 'C' and is made up of 12 pitch intervals (half-steps). There is one half-step between 'B' and 'C', and between 'E' and 'F'. There are two half-steps between the rest of the notes with the sharps falling on the half-steps between.

For example, beginning with the third octave, the notes are C3, C3#, D3, D3#, E3, F3, F3#, G3, G3#, A3, A3#, B3, C4, C4#, etc. To raise a note one half-step, its pitch is multiplied by the twelfth root of two (approximately 1.0595).

The original *Music+* program had a bug that showed up when the music was saved following use of the (M)ove command. The (M)ove command changes the pointer (actually a branch instruction offset) to the start of the music data allowing a portion of a song to be played. Moving and then saving caused the wrong start location to be saved and the entire song would not play when executed. Playing before saving prevents the problem. Adding `POKE A9,0:POKE A9+1,128:` to the beginning of Line 625 of the original program fixes the bug.

The first of the new commands is (H)dcopy, which is used to dump the music data between specified note columns to a printer. The command simply lists each column number followed by the note length and the four note names for that column. The `POKE 150,18` in Line 9600 sets the Baud rate to 2400. Change it to match your printer, if necessary.

Turn the printer off when playing music. The synthesis program generates a byte (eight bits) to the output port that drives the CoCo's six-bit digital-to-analog converter. One of the lower-order bits appears on the serial port while music is playing and will cause your printer to do strange things!

The other new command is (W)form.

Bob Ludlum is an electronics design engineer and holds a master's degree in electrical engineering. Bob lives in Panama City, Florida, and his hobbies include electronics, personal computers, classical and flamenco guitar, and flying.

It allows changing the wave form table to produce sounds with different timbres. The program prompts for the percentages of the fundamental and the first four overtones of the music wave form. The 256 values for the new wave form table are calculated (in BASIC) by summing the scaled sinusoidal fundamental and the second through the fifth harmonics.

The new wave form table is in effect for played and saved music until *Music+* restores the table after RUN. The original *Music+* organ wave form has 50 percent fundamental, and 25 percent each for the second and third harmonics. The sum of the percentages should equal 100.

The machine language program is located immediately above the BASIC screen editor in order to maximize the amount of memory available for holding music data. Adding the new commands required either relocating the machine language program (which would have destroyed compatibility with existing *Music+* music files) or shrinking the BASIC program.

I decided on the latter and removed the unnecessary spaces and packed the lines. Unfortunately, doing so makes describing the necessary steps to update the original *Music+* program very difficult. I'll be happy to make a copy of the latest version of the program if you send me a tape or (preferably) a disk in a self-addressed, stamped return mailer. My mailing address is 226 Pine Ridge Drive, Panama City, FL 32405.

I've been very pleased with the positive responses to *Music+* and hope the new commands will be useful. I'm especially grateful to all who were kind enough to send me some outstanding samples of their music. I encourage you to share your efforts with the readers of RAINBOW.

Editor's Note: Due to the length of the new and improved *Music+* program, we are unable to print the listing in THE RAINBOW. We will, however, include the modified *Music+* program on this month's RAINBOW ON TAPE. ☐

Place these values into the Music+ program or simply load and execute each song file from this month's RAINBOW ON TAPE. Either way, you'll be musically entertained.

The following contributors have sent us their compositions using the original *Music+* program. We have dumped the first portion of the music data from each song using *Music+*'s (H)dcopy command and have printed it for your enjoyment. Both songs will be provided in their entirety on this month's RAINBOW ON TAPE, immediately following the *Music+* program listing. Simply CLOADM and EXEC to play each song.

Scott Joplin's "The Entertainer"
By Bill Kast

The listing: ENTRTAIN

```
COL: LEN ,V1  ,V2  ,V3  ,V4
  1: 16  ,D6  ,D5  ,0   ,0
  2: 16  ,E6  ,E5  ,0   ,0
  3: 16  ,C6  ,C5  ,0   ,0
  4: 8   ,A5  ,A4  ,0   ,0
  5: 16  ,B5  ,B4  ,0   ,0
  6: 8   ,G5  ,G4  ,0   ,0
  7: 16  ,D5  ,D4  ,0   ,0
  8: 16  ,E5  ,E4  ,0   ,0
  9: 16  ,C5  ,C4  ,0   ,0
 10: 8   ,A4  ,A3  ,0   ,0
 11: 16  ,B4  ,B3  ,0   ,0
 12: 8   ,G4  ,G3  ,0   ,0
 13: 16  ,D4  ,D3  ,0   ,0
 14: 16  ,E4  ,E3  ,0   ,0
 15: 16  ,C4  ,C3  ,0   ,0
 16: 8   ,A3  ,A2  ,0   ,0
 17: 16  ,B3  ,B2  ,0   ,0
 18: 16  ,A3  ,A2  ,0   ,0
 19: 16  ,G3# ,G2# ,0   ,0
 20: 8   ,G3  ,G2  ,0   ,0
 21: 8   ,0   ,0   ,0   ,0
 22: 8   ,G5  ,D5  ,B4  ,G2
 23: 16  ,D4  ,B3  ,G3  ,0
 24: 16  ,D4# ,B3  ,G3  ,0
 25: 16  ,E4  ,C3  ,0   ,0
 26: 16  ,C5  ,C3  ,0   ,0
 27: 16  ,C5  ,C4  ,G3  ,E3
 28: 16  ,E4  ,C4  ,G3  ,E3
 29: 16  ,C5  ,G3  ,G2  ,0
 30: 16  ,C5  ,G3  ,G2  ,0
 31: 16  ,E4  ,C4  ,A3# ,G3
 32: 16  ,C5  ,C4  ,A3# ,G3
 33: 8   ,C5  ,F3  ,F2  ,0
 34: 8   ,C5  ,C4  ,A3  ,0
 35: 16  ,C5  ,0   ,0   ,E3
 36: 16  ,C6  ,E5  ,C5  ,E3
 37: 16  ,D6  ,F5  ,C4  ,G3
 38: 16  ,D6# ,F5# ,C4  ,G3
 39: 16  ,E6  ,G5  ,E5  ,G2
 40: 16  ,C6  ,E5  ,C5  ,G2
 41: 16  ,D6  ,F5  ,C4  ,G3
 42: 16  ,E6  ,G5  ,C4  ,G3
 43: 16  ,E6  ,G5  ,E5  ,G2
 44: 16  ,B5  ,D5  ,B4  ,G2
 45: 8   ,D6  ,F5  ,B3  ,G3
 46: 8   ,C6  ,E5  ,C5  ,C3
 47: 8   ,C6  ,E5  ,C4  ,G3
 48: 8   ,C6  ,E5  ,C4  ,G3
```

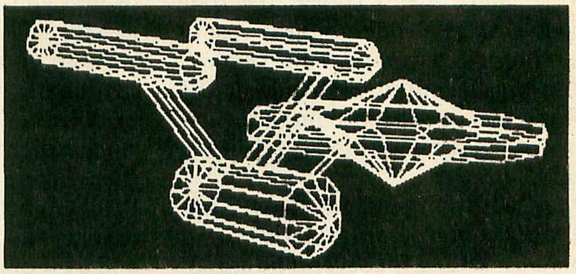
Handel's "Hallelujah Chorus"
By Dave Greenfield

The listing: HALELUJA

```
COL: LEN ,V1  ,V2  ,V3  ,V4
  1: 8   ,D5  ,A4  ,F4# ,D3
  2: 8   ,D5  ,G4  ,0   ,E3
  3: 8   ,D5  ,A4  ,0   ,F3#
  4: 8   ,A5  ,F5# ,0   ,D3
  5: 8   ,B5  ,G5  ,D5  ,G3
  6: 8   ,A5  ,F5# ,D5  ,D3
  7: 8   ,0   ,0   ,0   ,F3#
  8: 8   ,0   ,0   ,0   ,A3
  9: 8   ,D6  ,A5  ,F5# ,D3
 10: 8   ,D6  ,A5  ,F5# ,E3
 11: 8   ,D6  ,A5  ,F5# ,F3#
 12: 8   ,F5# ,D5  ,A4  ,D3
 13: 8   ,G5  ,C5# ,G4  ,E3
 14: 8   ,F5# ,D5  ,A4  ,D3
 15: 8   ,0   ,0   ,0   ,0
 16: 8   ,A5  ,D5  ,A4  ,F3#
 17: 8   ,G5  ,C5# ,A4  ,E3
 18: 8   ,F5# ,D5  ,A4  ,D3
 19: 8   ,E5  ,D5  ,A4  ,A3
 20: 8   ,E5  ,C5# ,G4  ,A2
 21: 8   ,D5  ,A4  ,F4# ,D3
 22: 8   ,A4  ,0   ,F4# ,D3
 23: 8   ,B4  ,0   ,G4  ,0
 24: 8   ,C5# ,0   ,E4  ,0
 25: 4.  ,D5  ,A4  ,F4# ,D3
 26: 8   ,A4  ,A4  ,D4  ,F3#
 27: 8   ,B4  ,G4  ,D4  ,G3
 28: 8   ,A4  ,F4# ,D4  ,D3
 29: 8   ,0   ,0   ,0   ,F3#
 30: 8   ,0   ,0   ,0   ,A3
 31: 4.  ,D5  ,A4  ,F4# ,D3
 32: 8   ,A4  ,A4  ,D4  ,F3#
 33: 8   ,B4  ,G4  ,D4  ,G3
 34: 8   ,A4  ,F4# ,D4  ,D3
 35: 8   ,0   ,0   ,0   ,0
 36: 16  ,D5  ,A4  ,D4  ,F3#
 37: 16  ,D5  ,A4  ,D4  ,F3#
 38: 8   ,D5  ,B4  ,G4  ,G3
 39: 16  ,D5  ,A4  ,F4# ,D3
 40: 16  ,D5  ,A4  ,F4# ,0
 41: 8   ,D5  ,B4  ,G4  ,0
 42: 16  ,D5  ,A4  ,D4  ,F3#
 43: 16  ,D5  ,A4  ,D4  ,F3#
 44: 8   ,D5  ,B4  ,G4  ,G3
 45: 16  ,D5  ,A4  ,F4# ,D3
 46: 16  ,D5  ,A4  ,F4# ,0
 47: 8   ,D5  ,B4  ,G4  ,D4
 48: 8   ,D5  ,A4  ,D4  ,F3#
 49: 8   ,C5# ,G4  ,E4  ,E3
 50: 8   ,D5  ,F4# ,A3  ,D3
 51: 8   ,D5  ,E4  ,A3  ,A3
 52: 8   ,C5# ,E4  ,A3  ,A2
 53: 8   ,D5  ,F4# ,A3  ,D3
 54: 8   ,A5  ,D5  ,A4  ,F3#
 55: 8   ,G5  ,C5# ,A4  ,E3
 56: 8   ,F5# ,D5  ,A4  ,D3
 57: 4.  ,E5  ,A4  ,C4# ,A3
 58: 8   ,A4  ,A4  ,E4  ,C4#
 59: 8   ,F5# ,A4  ,D4  ,D4
 60: 8   ,E5  ,A4  ,C4# ,A3
 61: 8   ,0   ,0   ,0   ,C4#
 62: 8   ,0   ,0   ,0   ,E4
 63: 4.  ,E5  ,A4  ,C4# ,A3
```

```
COL: LEN ,V1  ,V2  ,V3  ,V4
 64: 8   ,A4  ,A4  ,E4  ,C4#
 65: 8   ,F5# ,A4  ,D4  ,D4
 66: 8   ,E5  ,A4  ,C4# ,A3
 67: 8   ,0   ,0   ,0   ,0
 68: 16  ,E5  ,A4  ,E4  ,C4#
 69: 16  ,E5  ,A4  ,E4  ,C4#
 70: 8   ,F5# ,A4  ,D4  ,D4
 71: 16  ,E5  ,A4  ,C4# ,A3
 72: 16  ,E5  ,A4  ,C4# ,A3
 73: 8   ,0   ,F4# ,D4  ,A3
 74: 16  ,E5  ,A4  ,E4  ,C4#
 75: 16  ,E5  ,A4  ,E4  ,C4#
 76: 8   ,F5# ,A4  ,D4  ,D4
 77: 16  ,E5  ,A4  ,C4# ,A3
 78: 16  ,E5  ,A4  ,C4# ,A3
 79: 8   ,0   ,F4# ,D4  ,A3
 80: 8   ,E5  ,A4  ,E4  ,C4#
 81: 8   ,F5# ,A4  ,D4  ,D4
 82: 8   ,E5  ,A4  ,E4  ,C4#
 83: 8   ,D5  ,A4  ,F4# ,B3
 84: 8   ,D5  ,G4# ,D4  ,B3
 85: 8   ,C5# ,A4  ,E4  ,A3
 86: 16  ,0   ,A4  ,C4# ,E3
 87: 16  ,0   ,A4  ,C4# ,E3
 88: 8   ,0   ,A4  ,D4  ,F3#
 89: 8   ,0   ,A4  ,C4# ,E3
```

CREATE YOUR OWN
3-D GRAPHICS



- *Rotate, Move, Zoom, and Animate Multiple Objects Simultaneously*
- *Print 3-D Graphics Images on Radio Shack® Dot Matrix Printers*
- *Comes with Data for Spaceship Design*
- *Includes Editor to Create and Edit Coordinates for your own 3-D Graphics Images of Cars, Boats, Airplanes, Etc.*
- *Easy To Use • Requires 64K • Specify Disk or Tape*
- *Only $32.95 + $4.00 for Shipping and Handling*

Visa and Mastercard Accepted

Call for information about our Computer Aided Digital Circuit Design Program.

Logicware
730 W. McDowell
Phoenix, AZ 85007
(602) 821-2465

Radio Shack is a registered trademark of Tandy Corporation

Rejuvenate Father Time with a Chic Quartz-Locked Clock

By Henry C. Gernhardt, Jr.

Many years ago when I purchased my first computer I sorely felt the need for some sort of clock everytime DOS asked for the time and date. I solved the date problem with a calendar, but the cost of a quartz-locked board with battery backup was prohibitive. And all the clock circuits shown in computer and electronic magazines were very difficult to build.

Today, with computers that just a few years ago sold for several thousand dollars now selling for several hundred, it is possible to find quartz clock modules in many hobby shops. These black box modules are pre-wired, require no external circuitry and generally make use of widely available penlight cells that last for several years. They are even available with electronic gongs and chimes.

Construction begins with the hunt for parts. Locate either a five and one-quarter inch or eight-inch diskette. A magnetic tape reel could be substituted, but you will have to use some ingenuity since nine-track computer tape is incompatible with most diskette machines (unless you have a tape transport mechanism).

Next, you need a piece of mat board, cardboard, or a thin piece of plywood or hardboard. Cut this piece into a square slightly smaller than the diskette. (See Figure 1.) Cut, punch or drill a three-eighths-inch hole in the exact center. This dimension is not critical, and a bit of play may even be beneficial.

Use some double-sided tape, contact cement or any kind of adhesive to affix the mat board to the backside of the diskette. I used double-sided tape to hold everything together while the silicon rubber glue (RTV) set up. This allows for quick assembly, yet provides a secure joining of the two pieces.

Make sure the hold in the mat board is centered in the middle of the diskette jacket hub hole. Then center the diskette itself, making sure all three holes are concentric. A dab of RTV will ensure they remain centered.

For the diskette clock assemblies, quartz clock modules with one-quarter inch or shorter mounting collars should be used, but longer collars are acceptable if you use appropriate spacers or are making a computer tapereel-based unit. These marvelous little black boxes make use of both electronic and mechanical linkages and offer quartz-locked accuracy at an affordable price.

Mount the black box through the center hole from the back of the diskette assembly. Make sure the rubber gasket has been placed over the mounting collar. Put a brass washer and mounting nut over the collar from the front of the diskette and tighten. Mount the time indicators according to the directions that come with the module. Secure them with a cap nut, or an open nut if you plan to use a second indicator.

Viola! A handsome wall clock in the shape of a computer diskette. Various LCD and LED modules are also available. One of these can be mounted in the hub hole of a diskette or even in the head slot. For movements using electronic chimes, a thin box can be constructed in which to mount the chime, using the diskette as a lid.

I painted the second hands fluorescent orange, the hour hand red and the minute hand yellow to provide easily deciphered time. Dots, numerals and other kinds of markers for dial indicators are available from clock movement suppliers. I did not use dial indicators because I like the starkness of an unmodified and unmarked diskette with the orange second hand sweeping an

---

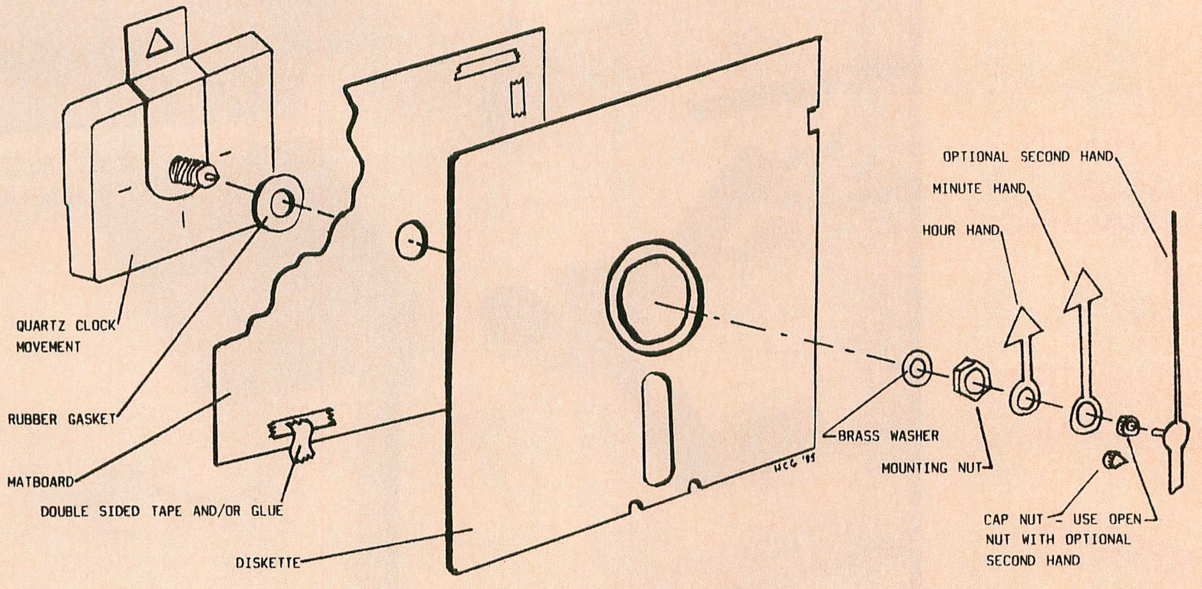
Henry Gernhardt lives in Huntington, West Virginia, and is the owner and operator of H and F Data Service. His company provides word processing, business graphics and data services to authors, students and local businesses.

eternal path around a black background. My diskette clock draws many compliments.

One supplier of quartz movements is Klockit, P.O. Box 629, Highway H North, Lake Geneva, WI 53147.

(You may contact Mr. Gernhardt with questions about the quartz clock construction at 926 Ninth St., Huntington, WV 25701, phone 304-697-4642. Please enclose an SASE when writing.) ☐

Figure 1


OPTIONAL SECOND HAND
MINUTE HAND
HOUR HAND
QUARTZ CLOCK MOVEMENT
RUBBER GASKET
MATBOARD
DOUBLE SIDED TAPE AND/OR GLUE
DISKETTE
BRASS WASHER
MOUNTING NUT
CAP NUT - USE OPEN NUT WITH OPTIONAL SECOND HAND
HCG '85

COSMOS©
COMPUTER SERVICES, INC.
P.O. Box 156 620 Stuart St.,
Green Bay, WI 54301 (414) 432-4635

Authorized Star Micronics Service Center * Call for return authorization number.

THE WAITING IS OVER!

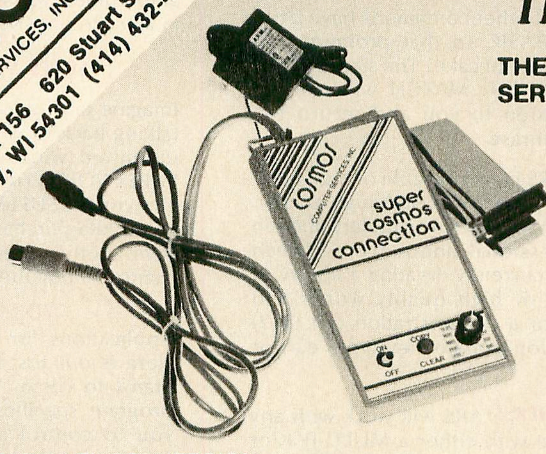
THE SUPER COSMOS CONNECTION
SERIAL TO PARALLEL CONVERTER *WITH* BUFFER!

YOU JUST CAN'T BUY A BETTER SERIAL/PARALLEL CONVERTER! ORDER YOURS TODAY

- 8K SUPER COSMOS CONNECTION

— *ONLY $129.95* —

8K RAM CHIP SOLD SEPARATELY - $15.95 each
3 FOR $42.95
16K VERSION - $144.95
24K VERSION - $154.95
32K VERSION - $169.95


cosmos
COMPUTER SERVICES INC.
super cosmos connection
ON
OFF
COPY
CLEAR

- SERIAL TO PARALLEL CONVERSION
- 110 TO 19,200 BAUD, 7 OR 8 BIT
- 8K BYTES STANDARD BUFFER (USER EXPANDABLE TO 32K IN 8K STEPS)
- COPY/CLEAR, LED PUSH BUTTON (MULTIPLE COPIES)
- MODEM SWITCH AND *ALL* CABLES
- COMPLETE WITH POWER PAK AND SIMPLE INSTRUCTIONS
- WORKS WITH *ANY* PARALLEL PRINTER OR YOUR MONEY BACK
- HIGHEST QUALITY CONSTRUCTION, *TWO-YEAR* WARRANTY

TEST RESULTS: *(19,056 BYTE PROGRAM LISTING AT 9600 BAUD.)*

32K SUPER COS-CON	OTHER INTERFACE
36.8 Seconds	4 min. 59.8 sec.

IF YOU'D RATHER BE USING YOUR COMPUTER THAN WAITING FOR YOUR PRINTER ..... *THE WAIT IS OVER.*

8K SUPER COSMOS CONNECTION
AND STAR SG-10 PRINTER
$379.00 Package S&H Included!

VISA MasterCard American Express Cards Welcome

NO SURCHARGE FOR CREDIT CARDS

Reviewed in Dec. 1985 Rainbow

Shipping Included!

Dealer Inquiries on Company Letterhead invited.

EARS™

Electronic
Audio
Recognition
System

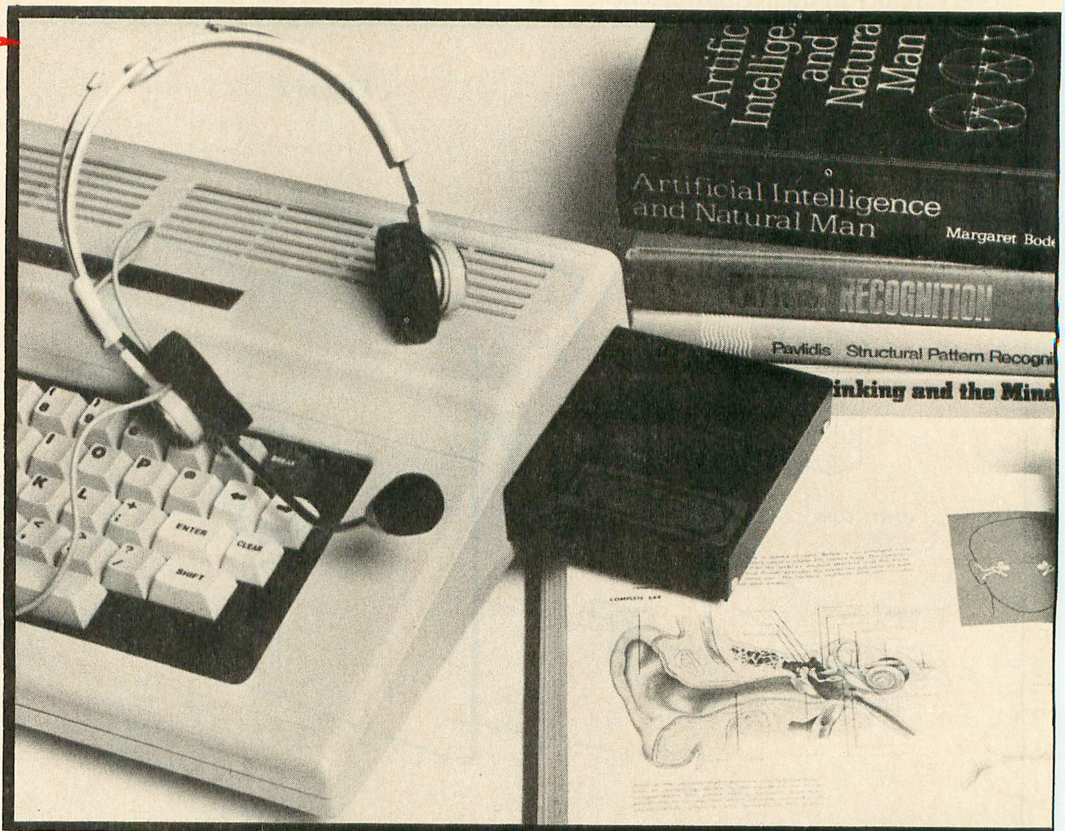
$99.95

Now Your Computer Can Listen To You!

- SPEECH RECOGNITION
- HANDS OFF PROGRAMMING
- HIGH QUALITY SPEECH REPRODUCTION

EARS Does It All!

INCREDIBLE!


Artificial Intelligence and Natural Man
Margaret Boden
PATTERN RECOGNITION
Pavlidis Structural Pattern Recogni
inking and the Mind
ENTER
CLEAR
SHIFT
BREAK

Two Years In the Making. Speech Systems was formed to develop new and innovative speech products. After 2 years of intensive Research and Development, we have created a truely sophisticated speech recognition device. Recognition rates from 95% to 98% are typical. Until now, such a product was outside the price range of the personnel computer market, and even small businesses.

EARS is trained by your voice and capable of recognizing any word or phrase. Training EARS to your particular voice print takes seconds. Up to 64 voice prints may be loaded into memory. You may then save on tape or disk as many as you like so that your total vocabulary is virtually infinite.

Speech and Sound Recognition. EARS is really a sound recognition system, so it really doesn't matter whether you speak in English, Spanish, or French. In fact you do not have to speak at all, you can train EARS to understand sounds such as a musical note or a door slamming.

Hands Off Programming. Imagine writing your own BASIC programs without ever touching the keyboard. Everything that you would normally do through a keyboard can now be done by just speaking.

Programming EARS Is Easy. LISTEN, MATCH and other commands have been added to BASIC so that programming EARS is a piece of cake! The single BASIC line: 10 LISTEN: MATCH will instruct EARS to listen to you and return the matching phrase.

It Talks. EARS is also capable of high quality speech. We mean REALLY high quality. The speech is a fixed vocabulary spoken by a professional announcer. Speech Systems is currently creating a library of thousands of high quality words and phrases. For a demonstration call **(312) 879-6844**, you won't believe your ears or our EARS.

DISK OWNERS. EARS will work with any disk system with either a MULTI-PAK or Y-CABLE. Our new Triple Y-CABLE was specifically developed for those wishing to add SUPER VOICE as a third device.

You Get Everything You Need. You get everything you need including a specially designed professional headset style noise cancelling microphone. The manual is easy to use and understand. Several demonstration examples are included so you don't have to write your own programs unless you want to. EARS will work in any 32K or 64K Color Computer.

SUPER VOICE $20 OFF

Imagine talking to your computer and it talking back to you. When you need an unlimited vocabulary, you can't beat SUPER VOICE. For a limited time, we will give you the SUPER VOICE for $59.95 with your EARS purchase. Even if you already have another speech unit, here is your chance to buy the best and save $20.

VOICE CONTROL

Applications for EARS are astounding. Here is our first of many listening programs to come. VOICE CONTROL is a program specifically designed to allow you to control any appliance in your house with your voice and our HOME COMMANDER (sold separately) or the Radio Shack Plug 'N' Power controller. For example, you can control your TV by saying "TV ON" or "TV OFF". . **$24.95**

FREE
BLANK DISK
OR TAPE
WITH EVERY
ORDER

VISA® MasterCard

Dealer Inquiries
Invited

We accept CASH, CHECK, COD, VISA and MASTER CARD orders.

Shipping and handling US and Canada	$3.00
Shipping and handling outside the US and Canada	$5.00
COD charge	$2.00

Illinois residents add 6¼% sales tax

Speech Systems

38W255 DEERPATH ROAD
BATAVIA, ILLINOIS 60510
(312) 879-6880 (TO ORDER)
1 MEGABYTE COLORAMA (312) 879-6811 (24 HR. BBS)

CALL ANY DAY TO ORDER. ALSO ORDER BY MAIL OR BBS.

EARS SPEECH LIBRARY™ *

NEW!

HIGH INTELLIGIBILITY SPEECH IS HERE

FEMALE VOICES COMING SOON

EARS is far more than a speech recognition system that enables your computer to listen to you. EARS and the EARS SPEECH LIBRARY bring "high quality" speech to the Color Computer. EARS doesn't sound like a "computer" or "robot," it sounds like real people. It sounds natural since we use real people to create the speech.

HERE'S HOW IT'S DONE. Speech Systems has invested nearly $10,000 in special audio digitizing and speech compression equipment. Each phrase is spoken by a human announcer digitized and then compressed so very little memory is used, typically less than 400 bytes per word. For those familiar with the Texas Instruments "SPEAK and SPELL" line of educational toys, you are aware of the results. For those wishing a demonstration, call (312) 879-6844.

FEMALE and CHILDREN'S VOICES COMING SOON. The technique we use is independent of the speaker. A male announcer is presently used, female and young people's voices coming soon.

NOW AREN'T YOU GLAD YOU OWN A COCO!

THE LIBRARY. Each group of the library contains words designed for a particular application. The SCIENTIFIC LIBRARY contains phrases designed for process or home control. The EDUCATIONAL LIBRARY has those words to help ensure keeping a child's attention. Words may be put together to form sentences and easily produced from BASIC, so you can write your own programs with incredible speech quality.

GENERAL 1
EARS SPEECH LIBRARY

AGAIN
ALL
AND
AT
BUY
CALL
CASE
CENT
CLEAR
CLOSE
COMPUTER
CONNECT
DAY
DIAL
DOLLAR
DOWN
DOOR
EAST
END
ENTER
FAST
FASTER
FIFTH
FIRST
GET
GO
HALF
HAVE
HOUR
IN
IS
IT
LEAVE
LEFT
LEVEL
LOVE
MORE
MULTIPLY
NEAR
NEED
NEXT
NICKEL
NO
NORTH
NUMBER
OF
OFF
ON
OUT
PASS
PENNY
PLEASE
QUARTER
READY
REACH
RIGHT
SECOND
SELECT
SEND
SET
START
STOP
SOUTH
THAN
THE
THIRD
TIME
UP
WAIT
WEST
YES
YOU

2 disks $19.95

GENERAL 2
EARS SPEECH LIBRARY

ADD
ASK
ASSISTANCE
AUTO
BUT
COCO
COMPLETE
CONTINUE
COPY
CORRECT
COST
DATE
DECREASE
DEPOSIT
DIME
DIVIDE
DRIVE
ENTRY
EXIT
FLOOR
FORWARD
FROM
GOING
GREAT
HELLO
HELP
HERE
HOLD
INCORRECT
INCREASE
JUST
KEY
LESS
LESSER
LIGHT
LOWER
LOWEST
MONEY
MOVE
NEAR
NEED
NEXT
NOT
NOTICE
ONWARD
OPEN
OR
OVER
PRESS
PLACE
PLAY
POINT
QUICK
RADIO
RECEIVE
RECORD
REPLACE
REVERSE
ROOM
SERVICE
SIDE
SLOW
SLOWER
SPACE
STATION
THANK YOU
THIS
TOTAL
TRY
TURN
USE
YOUR

2 disks $19.95

Alphabet/Numbers
EARS SPEECH LIBRARY

ONE
TWO
THREE
FOUR
FIVE
SIX
SEVEN
EIGHT
NINE
TEN
ELEVEN
TWELVE
THIRTEEN
FOURTEEN
FIFTEEN
SIXTEEN
SEVENTEEN
EIGHTEEN
NINETEEN
TWENTY
THIRTY
FORTY
FIFTY
SIXTY
SEVENTY
EIGHTY
NINETY
HUNDRED
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
THOUSAND
ZERO
ALPHA
BRAVO
CHARLIE
DELTA
ECHO
FOXTROT
GOLF
HOTEL
INDIA
JULIETT
KILO
LIMA
MIKE
NOVEMBER
OSCAR
PAPA
QUEBEC
ROMEO
SIERRA
TANGO
UNIFORM
VICTOR
WHISKEY
X-RAY
YANKEE
ZULU
MILLION

2 disks $19.95

SCIENTIFIC
EARS SPEECH LIBRARY

ABORT
ADJUST
ALARM
AMPERE
ATTENTION
BRAKE
BUTTON
CANCEL
CAUTION
CENTIGRADE
CHANGE
CHECK
CONTROL
CURRENT
DANGER
DEGREE
DISK
EMERGENCY
EQUAL
ERROR
EVACUATE
FAHRENHEIT
FAIL
FAILURE
FIRE
FREQUENCY
FEET
FLOW
FORCE
FUEL
GALLON
GAS
GRAM
HERTZ
HIGH
HIGHER
INCHES
INTRUDER
KILO
LIMIT
LOAD
LOCK
LOW
MEASURE
MARK
MEG
MEGA
METER
MICRO
MILE
MILLI
MINUS
MINUTE
NORMAL
OPERATOR
PER
PERCENT
PHASE
POUND
PRESSURE
PULSE
RANGE
SAFE
SMOKE
SPEED
SWITCH
SYSTEM
TEMPERATURE
TEST
VOLT
WARNING
WEIGHT

disks $19.95

EDUCATIONAL
EARS SPEECH LIBRARY

AFTER
AMIE
ANSWER
AROUND
AREA
AWAY
BEFORE
BOB
BOX
BOY
CAN
CAT
CHAIR
CHRIS
CLASS
DAY
DECIMAL
DESK
DIFFERENCE
DO
DOG
DRINK
FALL
FIND
FRACTION
GIRL
GIVE
GOOD
HILL
HORSE
HOW
JOHN
LAURA
LIKE
LINDA
LISA
MAKE
MEAGAN
MEASURE
MISSING
MODIFY
NAME
NIGHT
NOUN
PEOPLE
PERIOD
PHRASE
PRODUCT
PUT
QUESTION
RACHAEL
RICHARD
SAY
SENTENCE
SINK
SIT
SIGN
SOLVE
SPELL
SQUARE
SPRING
SUBTRACT
SUMMER
TABLE
TAKE
TEACHER
TIM
TOM
UNDER
VERB
WOULD
WINTER

2 disks $19.95

CUSTOM
EARS SPEECH LIBRARY

For those needing a custom vocabulary, Speech Systems offers customized speech libraries at the rate of $15 per phrase (5 seconds max.), 10 phrases minimum order. Provide an audio cassette tape with phrases or use our announcer. .... Minimum $150.00

SAVE $40
BUY 3
GET ALL 5
Introductory Offer†

*EARS and Disk system required.
†Custom Library not part of introductory offer.

SYMPHONY 12™

A 12 VOICE POLYPHONIC STEREO MUSIC SYNTHESIZER

NEW!
61 NOTE
KEYBOARD

$20
OFF

musical applications of microprocessors

- 12 SIMULTANEOUS VOICES
- STEREO & MONO
- 4 NOISE GENERATORS
- SOUND EFFECTS
- PLAYS AND MAKES MUSICA 2 FILES

SUPER POLYPHONIC. Speech Systems is proud to bring you SYMPHONY 12, a polyphonic 12 voice hardware stereo music synthesizer for the Color Computer. SYMPHONY 12 also gives you 4 noise generators for percussion synthesis and sound effects. The PIANO KEYBOARD and MUSICA 2 (sold separately) turns your COCO into a real music machine with incredible flexibility.

STEREO and MONO. By connecting SYMPHONY 12 to your home stereo system, music is produced in stereo, 6 voices from each channel. However, you don't need to have a stereo system, all 12 voices also come out of your TV or monitor.

PICK AN INSTRUMENT. SYMPHONY 12 lets you choose from 10 preset instruments to synthesize chimes, violin, oboe, banjo, harpsichord, piano and more. You can even change instruments as the music plays.

SOUND EFFECTS. SYMPHONY 12 is a sophisticated sound generator. 12 voices and 4 noise generators give you incredible sound effect capability. We have included gun shot, explosion, racing car and more.

WATCH IT PLAY. As SYMPHONY 12 plays, a graphics display of a piano keyboard shows the notes playing. The display is entertaining as well as very educational.

PLAY MUSICA 2 FILES. Thousands of MUSICA 2 users will be excited to know SYMPHONY 12 plays all music developed using MUSICA 2 like you have never Seen or Heard it. In fact we highly recommend the use of MUSICA 2 as a composition development tool for SYMPHONY 12. Use MUSICA 2's superior graphics input capability and then play it through SYMPHONY 12. You can also take advantage of our MUSIC LIBRARY series (sold separately) to give you access to over 500 music pieces representing 20 hours of music.

ULTIMATE MUSIC DEVELOPMENT SYSTEM. SYMPHONY 12, MUSICA 2, and the PIANO KEYBOARD give you incredible flexibility. Imagine sitting down at the PIANO KEYBOARD, playing a piece and recording it as you play just as you would to a tape recorder. Save your masterpiece and then using MUSICA 2 edit it if you like and print it. If you have a MIDI synthesizer, you can take the music and play it using COCO MIDI (sold separately). Try that on an IBM, APPLE, or COMMODORE (good luck).

PIANO KEYBOARD. For those wishing to turn SYMPHONY 12 into a real polyphonic synthesizer we offer the extremely powerful and versatile PIANO KEYBOARD. The PIANO KEYBOARD was deisgned to be used in our entire music product line. You can use it with SYMPHONEY 12, MUSICA 2, SYNTHER 77 PLUS, and even our advanced speech synthesizer, SUPER VOICE.

When using MUSICA 2, you will be using 4 of the 12 voices available from SYMPHONY 12. To take advantage of the full 12 voice capability of SYMPHONY 12 you may use either the Color Computer's keyboard or the PIANO KEYBOARD.

Y-CABLE or MULTI-PAK. Tape users using both SYMPHONY 12 and the PIANO KEYBOARD will require a Y-CABLE. Disk users will require the Triple Y-Cable or MULTI-PAK.

SYMPHONY 12. You get over a dozen music and sound effect selections and complete documentation. Software is shipped on Tape or Disk.

SYMPHONY 12	$79.95
SYMPHONY 12 (with Keyboard order)	$59.95
OPTIONS	
MUSIC LIBRARY (each volume)	$29.95
MUSICA 2	$29.95
PIANO KEYBOARD (61 note)	$129.95

FREE
BLANK DISK
OR TAPE
WITH EVERY
ORDER

Dealer Inquiries
Invited

We accept CASH, CHECK, COD, VISA and MASTER CARD orders.

Shipping and handling US and Canada	$3.00
Shipping and handling outside the US and Canada	$5.00
COD charge	$2.00

Illinois residents add 6¼% sales tax

Speech Systems

38W 255 DEERPATH ROAD
BATAVIA, ILLINOIS 60510
(312) 879-6880 (TO ORDER)
(312) 879-6811 (24 HRS. BBS)

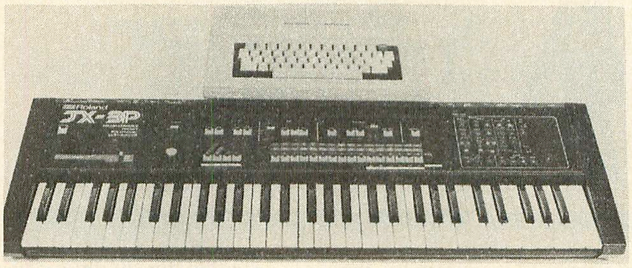
CALL ANY DAY TO ORDER. ALSO ORDER BY MAIL OR BBS.

1 MEGABYTE
COLORAMA

COCO MIDI SEQUENCER/EDITOR

Now your COCO can talk to your MIDI music synthesizer. Whether you have a Korg, Roland, Casio, Yamaha, or Moog, it doesn't matter as long as it's MIDI equipped. Choose from our entry level MUSICA 2 COCO MIDI system that plays MUSICA files or our Professional COCO MIDI SYSTEM.

- Supports up to 16 tracks.
- 2,000 events per track.
- 4,000 events all tracks.
- May be used as a sequencer.
- User friendly graphics display.
- Menu driven.
- Metronome available.
- Real time recording.
- Save your masterpiece to disk.
- Tempo may be modified.
- Quantizing to 32nd or 64th.



- Playback any or all tracks at any tempo.
- Tracks may be deleted, copied, transposed or mixed.
- Filter out unwanted channel or type of MIDI data.
- Simple music editing.
- Requires 64K disk system.
- Transposition.

Comes complete with Rom Pak Hardware interface, cables, manual, and software. Disk users require Y-Cable or Multi-Pak $149.95

Now under development, voicing patch libraries for the Casio CZ series of synthesizers.

CZ-101 USERS!

We offer the CZ-101 CONNECTION and the 61 NOTE PIANO KEYBOARD to turn the 101 into a professional full size synthesizer.

CZ-101 CONNNECTION .	$29.95
61 NOTE KEYBOARD .	$129.95

MUSICA MIDI™

COCO MIDI takes any MUSICA 2 music file and plays it through your music synthesizer. We offer you over 800 tunes from our MUSIC LIBRARY series (sold separately) or create your own music using the best music composition program available, MUSICA 2 (sold separately).

COCO MIDI includes: documentation, plenty of music, and the cable to connect between the COCO and your synthesizer. . . . . **$39.95** Tape or Disk

MUSIC LIBRARY™

The MUSIC LIBRARY series consists of 8 volumes: 100 through 800 each sold separately. Each contains over 100 four voice music selections with a playing time of over 3 hours each. The disk version is shipped on 5 full disks. When coupled with the STEREO PAK, the music is reproduced with unsurpassed realism.

A JUKEBOX program is included to allow you to select specific songs or automatically play each. These songs are ready to go, you don't need MUSICA 2 or a knowledge of music. MUSICA 2 users may customize each song. Each volume sold separately, specify tape or disk. . . . . **$29.95** Tape or Disk

MUSIC LIBRARY 100

Stage, Screen, & TV
Music of the 70's
Music of the 60's
Music of the 50's
Old Time Favorites
Classical
Christmas (popular)
Christmas (traditional)
Patriotic
Polka Party

MUSIC LIBRARY 200 (another 100 selections)
MUSIC LIBRARY 300 (another 100 selections)
MUSIC LIBRARY 400 (another 100 selections)
MUSIC LIBRARY 500 (another 100 selections)
MUSIC LIBRARY 600 (another 100 selections)
MUSIC LIBRARY 700 (another 100 selections)
MUSIC LIBRARY 800 (another 100 selections)

Entire Library
30 Hours of Music!
40 disks
or
25 tapes

SYNTHER 77 PLUS

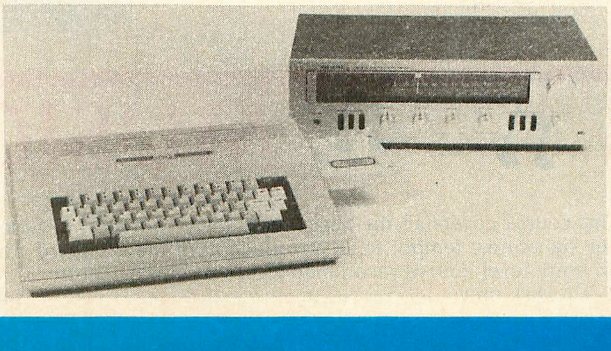
You control vibrato pattern, Bender rate, Volume level as well as Attack, Decay, Sustain, and Release (ADSR envelope). As you play you can record, then edit and save it to disk or tape. You can even fine tune it to match other instruments.

The PIANO KEYBOARD is not necessary, you can use your COCO keyboard but the PIANO KEYBOARD makes your COCO a real music instrument. . . . . . . **$29.95** Disk only

STEREO PAK™

Plug this gem into your computer, connect to your home stereo system and sit back and enjoy music realism. The STEREO PAK is a hardware music synthesizer that plays our MUSIC LIBRARY series and MUSICA 2 music in stereo. Because it was designed specifically with music reproduction in mind, the sound is superb. The highs are crisp and clear while the bass notes will rattle your walls. Internally we use two high performance 8 bit digital to analog converters to assure fidelity.

The STEREO PAK is all hardware. It is intended as an enhancement for MUSICA 2 and our MUSIC LIBRARY series. Disk users will require our Y-CABLE or a MULTI-PAK. **$39.95**



NEW! 61 NOTE PIANO KEYBOARD

ATTENTION CZ-101 OWNERS

The PIANO KEYBOARD and **SYMPHONY 12** turns the COCO into a 12 voice music synthesizer. When used with **MUSICA 2**, the PIANO KEYBOARD provides a user-friendly means of inputting music. For those wishing control over Vibrato, Volume, Bender, as well as Attach, Decay, Sustain, and Release (ADSR), we offer **SYNTHER 77 PLUS**, a monophonic synthesizer. **SUPER VOICE**, COCO's most advanced speech synthesizer, doubles as a music synthesizer when used with the PIANO KEYBOARD. For those with the Casio CZ-101 music synthesizer, the **CZ-101 CONNECTION** allows you to connect the "full size" PIANO KEYBOARD to give you standard keyboard.

61 NOTE PIANO KEYBOARD	**$129.95**
CZ-101 CONNECTION	**$ 29.95**

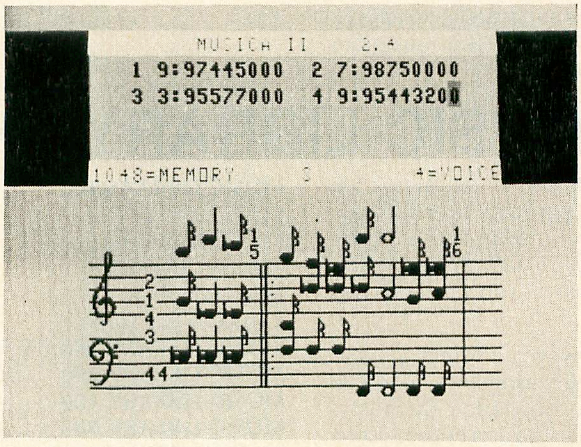
Our new 61 note (5 octave) full size keyboard is perfect for the beginner or professional. To give the PIANO KEYBOARD the most flexibility, we give you a choice of 5 different products to use: **SYMPHONY 12, MUSICA 2, SYNTHER 77 PLUS, SUPER VOICE, and the CZ-101 CONNECTION.**

MUSICA 2

$29.95

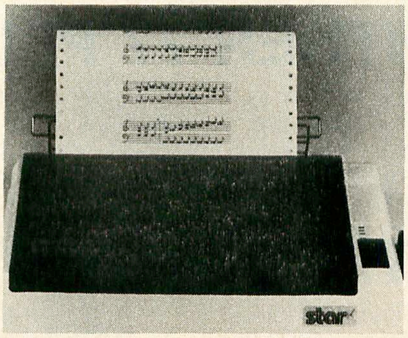
Tape or Disk

- When in stereo mode, music is played through our STEREO PAK (purchased separately).
- Loudness of each voice may be individually specified.
- Memory available is constantly displayed.
- Voice waveshapes may be exchanged between voices at any point.
- Tempo may be specified and may even be altered as the music plays.
- Flats and sharps supported.
- Billions of timbre combinations.
- High resolution graphic display, looks just like sheet music.
- MUSICA 2 is 100% software, no need for hardware unless you want music produced in STEREO. In that case, the STEREO PAK may be purchased separately. It's a must for the audiophile!
- Repeat bars allow repeating of music without re-inserting music a second or third time.
- 30 page manual describes all.
- Requires 64K.



```
          MUSICA II    2.4
 1 9:97445000  2 7:98750000
 3 3:95577000  4 9:95443200
1048=MEMORY     3        4=VOICE
```

- Output music to your printer (Gemini 10X, Epson, R.S. printers).



- Allows you to specify key signature.
- Voice timbre (waveshape) may be altered by specifying harmonic content just like stops on an organ.
- During editing, voice being inserted is displayed.
- Each measure is numbered for easy reading of music.
- Measure bars aid in reading and developing music.
- Each voice may be visually highlighted for easy identification.
- 4 Voices produced simultaneously.
- Input notes from Coco keyboard, joystick, or Piano Keyboard.
- Play music from your own BASIC program.
- Block copy music for easy music development.
- 100% machine language so it is lightning fast.
- Vibrato effect easily produced.
- With STEREO PAK, voices may be switched between left and right speakers as music plays.
- Durations include: whole, half, quarter, eighth, sixteenth, thirty-second, sixty-fourth, and triplet.

MUSIC THEORY

COURSE 1

This course covers all the basics from music notation & duration, key signatures, tempo, to an introduction of the keyboard. This is an entry level course recommended as a prerequisite for Course 2. 32K Disk only $49.95

COURSE 2

A more advanced course that deals with: Major and Harmonic Minor scales, interval spelling, Triad (Chord) theory, Inversions, Dominant 7th chords, and ear training of the intervals. 32K Disk only . **$49.95**

'SUPER VOICE' T.M.

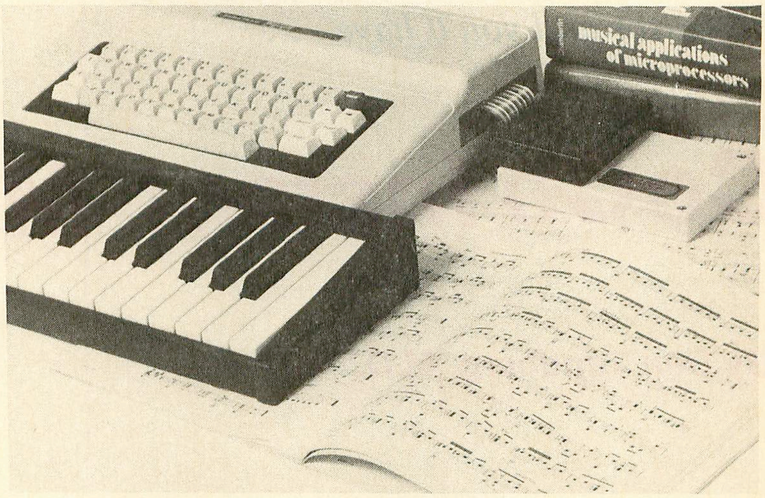
COCO'S MOST ADVANCED SPEECH SYNTHESIZER.

IT TALKS, SINGS AND MORE.

only . . . $79.95

WITH EARS PURCHASE

only . . . $59.95



SUPER VOICE is no ordinary speech synthesizer. It uses Silicon Systems, Inc. SSI-263, the most advanced speech/sound chip available. SUPER VOICE is not only capable of highly intelligible speech, sound effects, and singing over a 6 octave range, but now we have turned SUPER VOICE into a monophonic Super Music Synthesizer with our PIANO KEYBOARD.

IT TALKS. A free TRANSLATOR text-to-speech program makes writing your own talking program as easy as SAYING "HELLO."

SUPER VOICE works in any 32K or 64K computer. A disk system requires a Y-Cable or Multi-Pak.

FREE
"REACTION"
To Test Your Reflexes

FREE
SUPER VOICE
SINGS THE
STAR SPANGLED
BANNER

FREE
"SIMON"
To Test Your Memory

Here are the facts; the decision is yours.

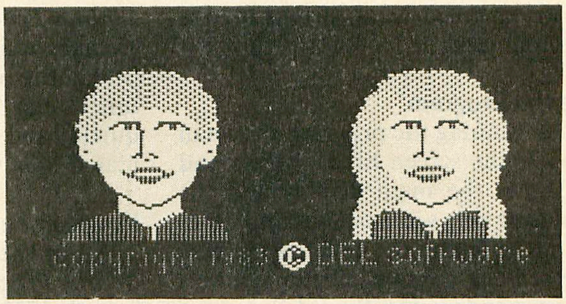
	SUPER VOICE	REAL TALKER	RS SPEECH CARTRIDGE	VOICE-PAK
Synthesizer Device	SSI-263	SC-01	SP-256	SC-01
Speaking Speeds	16	1	1	1
Volume Levels	16	1	1	1
Articulation Rates	8	1	1	1
Vocal Tract Filter Settings	255	1	1	1
Basic unit of Speech	64 phonemes 4 durations each	64 phonemes	64 allophones 5 pause lengths	64 phonemes
Pitch Variations	4098 (32 absolute levels with 8 inflection speeds)	4	1	4

SAVE $24.95

FREE

SUPER TALKING HEADS

Paul and Pauline, our talking heads program is normally $24.95. Until May 15 we will include them with each SUPER VOICE order.



FREE
BLANK DISK
OR TAPE
WITH EVERY
ORDER

Dealer Inquiries Invited

We accept CASH, CHECK, COD, VISA and MASTER CARD orders.

Shipping and handling US and Canada	$3.00
Shipping and handling outside the US and Canada	$5.00
COD charge	$2.00

Illinois residents add 6¼% sales tax

Speech Systems

38W 255 DEERPATH ROAD
BATAVIA, ILLINOIS 60510
(312) 879-6880 (TO ORDER)
1 MEGABYTE COLORAMA (312) 879-6811 (24 HR. BBS)

CALL ANY DAY TO ORDER. ALSO ORDER BY MAIL OR BBS.

Mix the PLAY command with Sound Processor and you'll have . . .

CoCo Instant Music

By Dan Tandberg, M.D.

The PLAY command in Extended Color BASIC is a useful and powerful command for creating sound effects and music on the CoCo, but has always seemed difficult to use in actual practice. The string arguments for this command must be written in BASIC and then laboriously altered using the EDIT command. This trial-and-error procedure can be cumbersome. To overcome this and other problems, I have written a specialized text editor, *Sound Processor*, to facilitate creating and using strings for the PLAY command.

Using the Program

When running the program shown in Listing 1, the screen briefly clears and then shows the main display and the first of four help screens. Pressing 'H' at any time brings up the next help screen. These screens contain all the symbols and commands in the *Sound Processor* program.

The display area on the top half of the screen contains the page number and the length of the string on that page. To create a sound, type in the symbols wanted and they are displayed. For example, try:

```
T200;O4;L40;V22;1;2;3;4;5;6;
```

To see how this sounds, press the space bar and this string will be executed using the PLAY command. (Review the section on the PLAY command in the Extended BASIC manual if this seems confusing.)

Small changes can easily be made in this string using the various features of *Sound Processor*. You can hear the changes quickly and conveniently before going on. In this way, sounds and music can be created and edited as quickly and easily as text can be manipulated on a word processor.

Program Features

All of the features and functions of *Sound Processor* are displayed on the four help screens for easy reference during use. Press 'H' until the first help screen labeled SYMBOLS appears. This is a list of all the characters that can be entered into a string argument for the PLAY command.

Note that the program allows the use of either letters (A through G) or numbers (1 through 12) for notes. In addition, the plus (or '#') and minus signs are used for sharps and flats. The length, tempo, pause, octave and volume parameters are listed with their allowable ranges. The other symbols, ';' '<', '>' and '.', are also used in the standard fashion. Anytime you press one of these valid characters, it is added to the string at the cursor position.

Press 'H' again to see the second help screen labeled CURSOR. This shows all of the possible ways the cursor can be manipulated. The right- and left-arrow keys move the cursor one space forward or backward and, if shifted, move it 10 spaces in the appropriate direction. The up-arrow key moves the cursor to the very beginning of the string (home) while the down-arrow key moves it to the end of the page. The CLEAR key deletes the character just in front of the cursor.

Sound Processor can edit and test up to eight different strings at once, with each string displayed on a separate "page." The shifted up- and down-arrow keys are used to move forward and backward. (When first running the program, all eight pages are, of course, empty.)

The third help screen, labeled PLAY ROUTINES, shows the different ways the strings can be executed. The space bar, as mentioned, plays one repetition of the string on the page displayed. Pressing ENTER plays the displayed

---

Dan Tandberg lives in Albuquerque where he teaches emergency medicine at the University of New Mexico.

string several times in a row. Initially, the sound is played three times, but the repeat counter can be set to any number desired using the '$' function. Finally, pressing the '@' key plays all the pages in rapid succession, beginning with page one and ending with page eight. These commands are especially helpful when writing music. Small sections can be developed separately and each tested using the space bar. The whole piece can then be played with '@'.

The last help screen contains the TRANSFER ROUTINES. These may seem a bit complicated, but are useful for moving strings or parts of strings around between pages. The '!' key extends a string by taking all the characters from the cursor to the end of the string and adding this substring onto the end of the string. This is especially helpful when you need to write a string with many repeated elements.

To see how this works, go to page two (use SHIFT-down arrow) and type in:

```
T4;L2;O4;V25;EEFGGFEDCCDE;
L2.;E;L8.;D;L2;D;P2;
```

Now play it using the space bar. Move the cursor to the beginning of the page (up arrow). Press the '!' key and watch what happens. To complete the phrase, change the last three notes to 'D', 'C' and 'C'. You can use this extend function repeatedly until the string becomes too long. (Each page is limited to 240 characters).

The insert command (close parenthesis) actually inserts a blank page and moves each page above it up by one. Any data in page eight is lost, so be careful. The delete command (open parenthesis) simply deletes a page and moves everything above it downward.

Pressing the '%' key allows you to exchange pages. For example, pages one and two can be swapped. The '&' key adds the page specified to the displayed page. The '=' key copies the displayed page to the page specified. You can also replicate a page with the apostrophe (') key. This makes a copy of the displayed page, inserts it into the next higher page and moves everything above upward. As with the insert command, the highest page is lost. Finally, pressing SHIFT and CLEAR together erases the entire displayed page, leaving all others intact.

Notice the message at the bottom of each help screen, `IF ERROR OR BREAK USE GOTO 10`. Whenever you make a syntax mistake in a string and try to play it, you'll get an error message (SN). If the program is run again, it erases all the strings already created. To avoid this, simply enter `GOTO 10` and the program returns to where you were. Fix the error in the string and go on.

Input/Output Routines

Press 'I' at any time to bring up the I/O menu. This is used for saving or loading strings created to or from tape. Strings can be sent to the line printer as well by using option seven.

Perhaps the most useful I/O routines are three and four. These save either the displayed page or all eight pages to tape, but as `DATA` statements with line numbers. These files can be reloaded at a later time and used in your own BASIC programs without retyping any of the data.

Modifications

Sound Processor can easily be modified to hold more pages of strings. Simply increase the value of 'Z' in Line 560 to suit your own needs. Also increase the amount of string space cleared in Line 20. Lines 650 and 660 may also be altered to produce `DATA` statements with different line numbers, if needed.

The *Sound Processor* can also be modified for disk operation by simply changing the device number in Line 670 and making minor changes in a few other lines. Substituting the lines shown in Listing 2 demonstrates one method of doing this.

I've found that using the *Sound Processor* markedly improves the utility of the `PLAY` command. Having all the information continuously available from the help screens is a real plus. Sound effects or music can be developed in a matter of minutes rather than hours. When a set of strings is finished, saving them as `DATA` lines using option four from the I/O menu produces a file that can be incorporated into one of your own BASIC programs. I would enjoy hearing about any modifications or unique applications.

(Questions about this program can be directed to Dr. Tandberg at 4130 Coe Drive NE, Albuquerque, NM 87110, phone 505-256-9457. Please enclose an SASE when writing.) ☐

FOR CASSETTE VERSION

130	93
310	27
430	40
500	49
590	203
END	60

Listing 1: `SOUNDCAS`

```
10 'SOUND PROCESSOR
     DAN TANDBERG, M.D.
     ALBUQUERQUE, NEW MEXICO
20 IFF=0THENCLEAR4000:GOSUB550
30 CLS:GOSUB240
40 L=LEN(N$(I)):PRINT@0,"PAGE";I
;"OF";Z:PRINT@20,"LENGTH=";
50 PRINT@27,L,LEFT$(N$(I),C);CHR
$(207);RIGHT$(N$(I),L-C):GOSUB10
0
60 N=INSTR(Q$,K$):IFN>23THENIF L
<X THENN$(I)=LEFT$(N$(I),C)+K$+R
IGHT$(N$(I),L-C):C=C+1:L=L+1:GOT
O50ELSEGOTO50
70 IFN>12THENPRINT@32,C$:PRINT@3
2,"";:ON N-12 GOSUB250,270,290,3
00,310,330,360,370,390,410,430:P
RINT@32,C$:PRINT@32,"";ELSE ON N
 GOSUB120,130,140,150,160,170,18
0,190,200,210,220,230
80 GOTO40
90 'WAIT SUBROUTINE
100 K$=INKEY$:IFK$=""THEN100ELSE
RETURN
110 'MAIN SUBROUTINES
120 C=C-(C<L):RETURN
130 C=C+(C>0):RETURN
140 IFC<(L-9)THENC=C+10:RETURNEL
SEC=L:RETURN
```

```
150 IFC>9THENC=C-10:RETURNELSEC=
0:RETURN
160 C=0:RETURN
170 C=L:RETURN
180 PLAYN$(I):RETURN
190 IFC>0THENN$(I)=LEFT$(N$(I),C
-1)+RIGHT$(N$(I),L-C):C=C-1:RETU
RNELSERETURN
200 FORK=1TOR:PLAYN$(I):NEXTK:RE
TURN
210 FORK=1TOZ:PLAYN$(K):NEXTK:RE
TURN
220 IFL+LEN(RIGHT$(N$(I),L-C))<=
X THENN$(I)=N$(I)+RIGHT$(N$(I),L
-C):C=C+LEN(RIGHT$(N$(I),L-C)):R
ETURNELSERETURN
230 H=H+1:IFH>3THENH=0
240 PRINT@288,H$(H);:RETURN
250 IFI<Z THENI=I+1ELSEI=1
260 C=0:RETURN
270 IFI>1THENI=I-1ELSEI=Z
280 C=0:RETURN
290 PRINT"ERASE THIS PAGE?  (Y/N
)";:GOSUB100:IFK$<>"Y"THENRETURN
ELSEN$(I)="":C=0:RETURN
300 PRINT"REPEAT COUNTER IS SET
TO";R:INPUT"ENTER NEW VALUE";R:I
FR<1THENR=1:RETURNELSERETURN
310 INPUT"PAGE TO APPEND";K:IFK>
Z OR K<1THENRETURN
320 IFLEN(N$(I)+N$(K))<X THENN$(
I)=N$(I)+N$(K):C=L:RETURNELSERET
URN
330 PRINT"REPLICATE THIS PAGE?
(Y/N)";:GOSUB100
340 IFK$<>"Y"ORI=Z THENRETURN
350 FORK=Z-1TOI STEP-1:N$(K+1)=N
$(K):NEXTK:RETURN
360 PRINT"EXCHANGE THIS PAGE WIT
H PAGE #";:INPUTK:IFK<1ORK>Z THE
NRETURNELSEN$(0)=N$(I):N$(I)=N$(
K):N$(K)=N$(0):C=0:RETURN
370 PRINT"INSERT A BLANK PAGE?
(Y/N)":GOSUB100
380 IFK$<>"Y"ORI=Z THENRETURNELS
EFORK=Z-1TOI STEP-1:N$(K+1)=N$(K
):NEXTK:N$(I)="":C=0:RETURN
390 PRINT"DELETE THIS PAGE?  (Y/
N)":GOSUB100
400 IFK$<>"Y"THENRETURNELSEIFI=Z
 THENN$(I)="":C=0:RETURNELSEFORK
=I TO Z-1:N$(K)=N$(K+1):NEXTK:N$
(Z)="":C=0:RETURN
410 PRINT"COPY PAGE";I;"TO PAGE
#";:INPUTK:IFK<1ORK>Z THENRETURN
ELSEN$(K)=N$(I):C=0:RETURN
420 'I/O ROUTINES
430 CLS:PRINT"   I/O ROUTINES:",
STRING$(32,208);"0  EXIT I/O MEN
U","1  SAVE PAGE",,"2  SAVE ALL
PAGES","3  SAVE PAGE (DATA)"
440 PRINT"4  SAVE ALL PAGES (DAT
A)","5  LOAD PAGE",,"6  LOAD ALL
 PAGES","7  LPRINT ALL PAGES","8
  SAVE MAIN PROGRAM":GOSUB100
450 CLS:N=INSTR(M$,K$):IFN=0THEN
GOSUB240:RETURN
460 ON N GOSUB470,480,490,500,51
0,520,530,540:GOTO430
470 PRINT"SAVE PAGE";I:INPUT"CAS
SETTE READY TO RECORD?       FIL
ENAME";K$:PRINT "SAVING PAGE";I:
OPEN"O",#D,K$:PRINT#D,N$(I):PRIN
TN$(I):CLOSE#D:RETURN
480 PRINT"SAVE ALL PAGES:":INPUT
"CASSETTE READY TO RECORD?
 FILENAME";K$:PRINT "SAVING PAGE
S";1;"TO";Z:OPEN"O",#D,K$:FORK=1
TOZ:PRINT#D,N$(K):PRINTN$(K):NEX
TK:CLOSE#D:RETURN
490 PRINT"SAVE PAGE (DATA)";I:IN
PUT"CASSETTE READY TO RECORD?
    FILENAME";K$:PRINT"SAVING PA
GE";I;"(DATA)":OPEN"O",#D,K$:K$=
STR$(Q)+" DATA "+N$(I):PRINT#D,K
$:PRINTK$:CLOSE#D:RETURN
500 PRINT"SAVE PAGES (DATA):":QQ
=Q:INPUT"CASSETTE READY TO RECOR
D?       FILENAME";K$:PRINT"SAVI
NG ALL PAGES (DATA)";I:OPEN"O",#
D,K$:FORK=1TOZ:K$=STR$(QQ)+" DAT
A "+N$(K):PRINT#D,K$:PRINTK$:QQ=
QQ+A:NEXTK:CLOSE#D:RETURN
```

Two-Liner Contest Winner . . .

This little routine is great as a stand-alone or it could be incorporated into most any home written education program. Alter it to suit your needs.

The listing:

```
10 CLS:PRINT@160,"I WILL TEACH Y
OU YOUR           MULTIPLICATION
 TABLES.":INPUT"WHICH TABLE(1-12
)";M:CLS:Y=RND(12):PRINT@200,"WH
AT IS"M"*"Y"":INPUT A:IF A=M*Y T
HENPRINT"CORRECT":FOR P=1TO460*5
:NEXT:GOTO10
20 CLS:PRINT@205,"WRONG":FOR P=1
TO460*5:NEXT:GOTO10
```

Mary Hooper
Waterford, Ontario

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

```
510 PRINT"LOAD PAGE:";I:INPUT"CA
SSETTE READY TO PLAYBACK?     FI
LENAME";K$:PRINT"LOADING PAGE";I
:OPEN"I",#D,K$:INPUT#D,N$(I):PRI
NTN$(I):CLOSE#D:RETURN
520 PRINT"LOAD ALL PAGES:":INPUT
"CASSETTE READY TO PLAYBACK?
 FILENAME";K$:PRINT"LOADING PAGE
S";1;"TO";Z:OPEN "I",#D,K$:FORK=
1TOZ:INPUT#D,N$(K):PRINTN$(I):NE
XTK:CLOSE#D:RETURN
530 PRINT"LINEPRINTING ALL PAGES
":INPUT"PRINTER ON";K$:IFK$<>"Y"
THENRETURNELSEFORK=1TOZ:PRINTN$(
K):PRINT#-2,N$(K):PRINT#-2:NEXTK
:RETURN
540 PRINT"SAVING MAIN PROGRAM:":
CSAVE"SP":RETURN
550 'INITIALIZATION
560 Z=8:DIMN$(Z):'# OF PAGES
570 X=240:'MAX PAGE LENGTH
580 C$=STRING$(X,32):'BLANK
590 DIMH$(3):FORH=0TO3:READH$(H)
:H$(H)=H$(H)+LEFT$(C$,192-LEN(H$
(H))+">>IF ERROR OR BREAK USE G
OTO 10":NEXTH:H=0:'HELP SCREENS
600 Q$=CHR$(9)+CHR$(8)+CHR$(93)+
CHR$(21)+CHR$(94)+CHR$(10)+CHR$(
32)+CHR$(12)+CHR$(13)+"@!H"+CHR$
(91)+CHR$(95)+CHR$(92)+"$&'%)(=I
ABCDEFG1234567890#+-.><;OLTVP":'
MAIN STRING
610 M$="12345678":'I/O STRING
620 C=0:'CURSOR POSITION
630 I=1:'PAGE POINTER
640 R=3:'REPEAT COUNTER
650 Q=9000:'DATA LINE #
660 A=10:'LINE # INCREMENT
670 D=-1:'DEVICE #
680 F=1:'RESTART FLAG SET
690 RETURN
700 DATA"SYMBOLS:           LENGTH
L1-L255                   TEMPO
T1-T255  ABCDEFG          PAUSE
P1-P255  1; - 12;         OCTAVE
O1-O5    #+-.<>;          VOLUME
V1-V31"
710 DATA"CURSOR:            (SHIF
TED)     <- LEFT         <- LEFT
 TEN     -> RIGHT        -> RIGH
T TEN    UP HOME         UP LAST
 PAGE    DN END          DN LAST
 PAGE      (CLEAR TO DELETE)
720 DATA"PLAY ROUTINES:
           SPACE  PLAY THIS PAGE
           ENTER  PLAY WITH REPE
AT             @  PLAY ALL PAGES
               $  CHANGE REPEAT
COUNTER"
730 DATA"TRANSFER ROUTINES:
           ! EXTEND         ) INSER
T PAGE     % EXCHANGE       ( DELET
E PAGE     ' REPLICATE      = COPY
PAGE       & APPEND         I I/O M
ENU          (SHIFT/CLEAR TO ERASE
PAGE)"
740 END
```

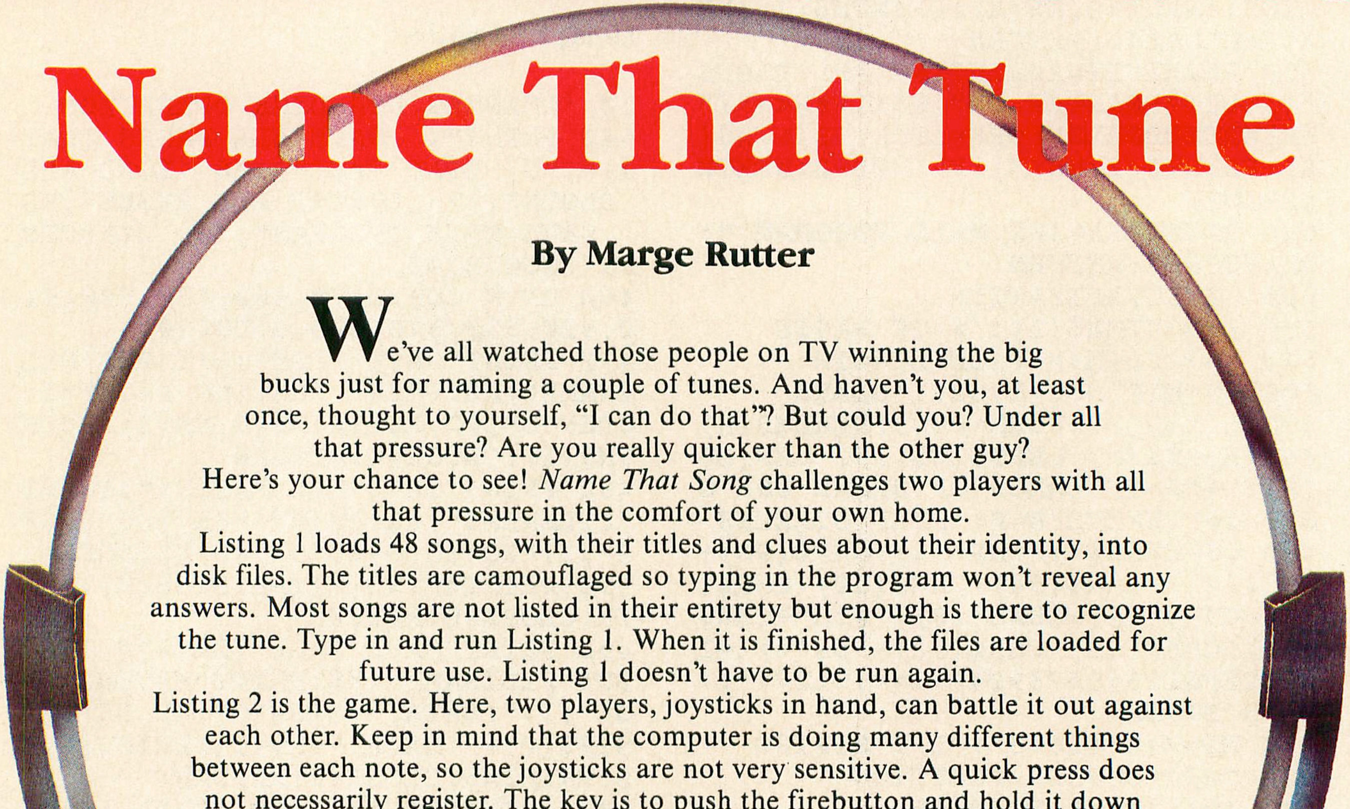
Listing 2: SOUNDISK

```
10 'CHANGES FOR DISK OPERATION
440 PRINT"4  SAVE ALL PAGES (DAT
A)","5  LOAD PAGE",,"6  LOAD ALL
 PAGES","7  LPRINT ALL PAGES","8
  SAVE MAIN PROGRAM","9  DIRECTO
RY":GOSUB100
460 ON N GOSUB470,480,490,500,51
0,520,530,540,545:GOTO430
470 PRINT"SAVE PAGE";I:INPUT"FIL
ENAME";K$:PRINT "SAVING PAGE";I:
OPEN"O",#D,K$:PRINT#D,N$(I):PRIN
TN$(I):CLOSE#D:RETURN
480 PRINT"SAVE ALL PAGES:":INPUT
"FILENAME";K$:PRINT "SAVING PAGE
S";1;"TO";Z:OPEN"O",#D,K$:FORK=1
TOZ:PRINT#D,N$(K):PRINTN$(K):NEX
TK:CLOSE#D:RETURN
490 PRINT"SAVE PAGE (DATA)";I:IN
PUT"FILENAME";K$:PRINT"SAVING PA
GE";I;"(DATA)":OPEN"O",#D,K$:K$=
STR$(Q)+" DATA "+N$(I):PRINT#D,K
$:PRINTK$:CLOSE#D:RETURN
500 PRINT"SAVE PAGES (DATA):":QQ
=Q:INPUT"FILENAME";K$:PRINT"SAVI
NG ALL PAGES (DATA)";I:OPEN"O",#
D,K$:FORK=1TOZ:K$=STR$(QQ)+" DAT
A "+N$(K):PRINT#D,K$:PRINTK$:QQ=
QQ+A:NEXTK:CLOSE#D:RETURN
510 PRINT"LOAD PAGE:";I:DIR:INPU
T"FILENAME";K$:PRINT"LOADING PAG
E";I:OPEN"I",#D,K$:INPUT#D,N$(I)
:PRINTN$(I):CLOSE#D:RETURN
520 PRINT"LOAD ALL PAGES:":DIR:I
NPUT"FILENAME";K$:PRINT"LOADING
PAGES";1;"TO";Z:OPEN "I",#D,K$:F
ORK=1TOZ:INPUT#D,N$(K):PRINTN$(I
):NEXTK:CLOSE#D:RETURN
530 PRINT"LINEPRINTING ALL PAGES
":INPUT"PRINTER ON";K$:IFK$<>"Y"
THENRETURNELSEFORK=1TOZ:PRINTN$(
K):PRINT#-2,N$(K):PRINT#-2:NEXTK
:RETURN
540 PRINT"SAVING MAIN PROGRAM:":
SAVE"SP":RETURN
545 DIR:GOTO100
610 M$="123456789":'I/O STRING
670 D=1:'DEVICE #
```

MUSIC GAME 32K Disk

CoCo Dares You to Name That Tune

By Marge Rutter



We've all watched those people on TV winning the big bucks just for naming a couple of tunes. And haven't you, at least once, thought to yourself, "I can do that"? But could you? Under all that pressure? Are you really quicker than the other guy?

Here's your chance to see! *Name That Song* challenges two players with all that pressure in the comfort of your own home.

Listing 1 loads 48 songs, with their titles and clues about their identity, into disk files. The titles are camouflaged so typing in the program won't reveal any answers. Most songs are not listed in their entirety but enough is there to recognize the tune. Type in and run Listing 1. When it is finished, the files are loaded for future use. Listing 1 doesn't have to be run again.

Listing 2 is the game. Here, two players, joysticks in hand, can battle it out against each other. Keep in mind that the computer is doing many different things between each note, so the joysticks are not very sensitive. A quick press does not necessarily register. The key is to push the firebutton and hold it down until the song stops. If the joysticks don't have any effect on the song, you

Marge Rutter is currently studying to become a computer science teacher and holds a bachelor's degree in education/foreign languages. She lives in Phoenixville, Pennsylvania with her husband, two children and Color Computer.

need to change lines 5110, 5120 and 5135. The numbers 126 and 125 should be substituted for the numbers 254 and 253, respectively. Apparently, some CoCos produce one set of these numbers when the firebutton is pressed and others produce the other set.

Each song plays for only 30 seconds before the computer goes on to another song. If you want more time, increase the timer in Line 5125.

When the song is stopped, the computer allows time for the player to announce the answer verbally, before giving the correct answer. The players decide whether the answer will be accepted or not.

If the players decide to set a time limit and one of them takes too long, simply mark that answer as wrong, so there will be no point given.

Finally, since the songs are selected randomly some of them could easily be played two or more times during the course of the game.

However, flags are set on songs that have been played and each new song is checked to make sure it hasn't been played before. Occasionally, the program appears to lock up when it's trying to find a new song. If this happens, relax. Think of it as a commercial and it will be right back.

The game is divided into five parts:

Melody Roulette — Melody Roulette starts out with a spinning wheel to determine how much money you are playing for. The best out of five songs wins this part. A tiebreaker is played if necessary.

Tune Topics — The 48 songs are divided into six categories. One of these categories is randomly chosen and the five songs are selected from that category. Once again, the best out of five wins and tiebreakers are played in the event of a tie.

This is the one area in which the program could lock up permanently. In the unlikely event that too many songs from the chosen category were already played during Melody Roulette (leaving less than five songs to choose from) or if too many tiebreakers empty out the category, the program goes into an endless loop, searching for a song in the category when one doesn't exist. Just press BREAK and start over.

Bid-a-Note — On TV, if the player who bids can't name the song correctly, the other player gets the point. This has never seemed fair to me. So in my version of the game, I've made it impossible to win Bid-a-Note by default. If you don't bid, you don't win.

There is nothing in the program to prevent a player from bidding higher than the previous bid. Similarly, there is nothing to stop the first player from passing on the first bid. If the first player does pass the first time around, the second player gets the bid for 15 notes. Again, the best out of five wins.

Tiebreaker — Melody Roulette and Tune Topics are each worth 10 game points. Bid-a-Note is worth 20. So, it is possible to have a tie at the end of the first three parts. A simple, sudden death tiebreaker decides who goes on to the Golden Medley.

Golden Medley — Now one of the players is on his own and the pressure is really on. He has 30 seconds to name five songs. The timer runs only while the music is playing. Press the firebutton (using the right joystick) to stop the timer for the answer. Or, if not sure, pass and come back to it afterwards. Remember, one wrong answer ends the game! If you need reminders on how to play, there are optional directions before each section.

(Questions about this program may be directed to the author at 48 Kenalcon Drive, Phoenixville, PA 19460, phone 215-933-8612. Please enclose an SASE when writing.) ☐

```
260 .......84    1430 .....243
550 .......79    1530 ......97
630 ......105    1620 .....222
710 .......80    1740 .....114
790 ......239    1880 ......45
900 .......60    2010 .....150
1000 .....171    3025 .....175
1090 .....105    3100 .....104
1210 .....110    3165 .....227
1310 .....101    END .....175
```

Listing 1: SONGS

```
10 OPEN "D",#1,"SONGS/DAT",3
15 FIELD#1,3 AS NO$
20 FOR X=200 TO 9600 STEP 200
30 Z=X
```

SPECTROGRAM
MAGAZINE FOR COLOR COMPUTER USERS.

* Programs for business, home management, self-improvement, games, utilities
* Reviews of Color Computer products
* Tutorials on programming in Assembly, C, Pascal, and Basic
* Contests

GROUP RATES: $15 with orders of 5 or more subscriptions!

SPECIAL OFFER

As an introductory offer, you can order the first year of SPECTROGRAM Magazine at 40% off the cover price. For $18, you will receive 12 issues of the magazine that could become the most informative addition to your Color Computer system.
We want to establish a line of two-way communication between our staff and our readers as an aid in serving your needs. Please enclose any comments or special requests with your subscription form.

PLEASE SEND ME 12 ISSUES OF SPECTROGRAM MAGAZINE FOR $18 (40% OFF THE COVER PRICE).

Name: ____________________
Address: ____________________
City: ____________________
State: __________ Zip: __________
( ) Check enclosed ( ) Visa ( ) Mastercard
Card # __________ Exp. Date __________

Mail to: SPECTROGRAM Magazine
P.O. Box 138
Rockford, IL 61105
(815) 968-9600

```
40 FOR C=1 TO 2
50 READ S$
60 RSET NO$=S$
70 PUT#1,Z
80 Z=Z+1
90 IF S$="P20" THEN C=2 ELSE C=1
100 NEXT C
110 NEXT X
120 CLOSE#1
130 OPEN"O",#2,"TITLES/DAT"
140 FOR X=1 TO 6
150 READ CA$
160 WRITE#2,CA$
170 FOR Y=1 TO 8
180 READ NO
190 FOR Z=1 TO NO
200 READ CH
210 A$=A$+CHR$(CH)
220 NEXT Z
230 WRITE #2,A$
235 A$=""
240 NEXT Y
250 NEXT X
260 CLOSE#2
300 OPEN"D",#1,"CLUES/DAT",100
310 FOR X=1 TO 48
320 READ CL$
330 WRITE#1,CL$
340 PUT#1,X
350 NEXT X
360 CLOSE#1
500 DATA T2,L8,O3,G,E,L4,G,L8,G,
E,L4,G,L8,A,G,F,E,D,E,L4,F,L16,E
,F,L8,G,C,L16,C,C,L8,C,L16,C,D,E
,F,L4,G,L8,G,D,D,F,E,D,L4,C,P20
510 DATAT2,O2,L4,G,L8,G,G,L4,G,L
8,G,G,L4,B,L8,O3,D,D,O2,B,B,L4,G
,A,L8,A,L4,A,L8,A,A,L4,F#,L8,A,A
,F#,F#,L4,D
520 DATAL8,G,G,G,G,L4,G,L8,G,G,L
4,B,L8,O3,D,D,O2,B,B,G,L3,O3,D,L
8,C,C,O2,B,A,A,L2,G,P20
530 DATAT3,O3,L2,G,L4,E,L2,C,L6,
C,L8,D,L4,E,L2,G,L4,E,L2,C,G,L4,
E,L2,C,L4,D,E,L2,F#,G,A,L4,G,L8,
A,L4,A#,A,G,L4,E,D,D,L8,E,L4,F,E
,L8,D,G,G,G,P20
540 DATAT3,O3,L4,C,L8,C,L4,C,L8,
D,L4,E,E,L8,E,L4,D,L8,C,L4,D,L8,
E,L2,C,L4,E,E,L8,F,L4,G,G,F,L8,E
,L4,F,L8,G,L4,E,P20
550 DATAT4,O3,L4,C,C,C,L2,D,L4,D
,E,G,E,L2,C,O2,L4,G,O3,L2,C,L4,C
,L2,D,L4,D,L2,E,L3,C,L4,O2,G,O3,
L2,C,L4,C,L2,D,L4,D,E,G,E,L2,C,L
4,A,P18,L4,D,F,L2,E,C,P20
560 DATAT3,O3,L4,G,L8,G,L4,E,L8,
A,L3,G,E,L4,G,L8,G,L4,E,L8,A,L3,
G,E,G,E,G,L4,E,L8,G,L3,G,G,O4,C,
P20
570 DATAT2,O3,L8,E,D,C,D,E,E,L4,
E,L8,D,D,L4,D,L8,E,G,L4,G,L8,E,D
,C,D,E,E,L4,E,L8,E,D,D,E,D,L2,C,
P20
580 DATAT2,O3,L4,C,C,G,G,A,A,L2,
G,L4,F,F,E,E,L8,D,D,D,D,L2,C,L4,
G,G,F,F,E,E,L2,D,L4,G,G,F,F,E,E,
L2,D
590 DATAL4,C,C,G,G,A,A,L2,G,L4,F
,F,E,E,D,D,L1,C,P20
600 DATAT2,L4,O4,C,L8,C,C,C,L4.,
C,P8,O3,L8,A#,O4,D,O3,A#,L4,O4,C
,L8,D,O3,A#,O4,C,L4.,C,P4,O3,L4,
A,L8,A#,O4,C,L2,D,C,P8,L8,D,O3,A
#,G,L4,F,L8,F,E,L2,D,L4,C,P20
610 DATAT2,L8,O4,D#,L4,C,L16,C,O
3,A#,O4,C,O3,A#,L8,O4,C,O3,G,L16
,O4,C,O3,A#,L8,O4,C,C,L16,C,O3,A
#,O4,C,C,L8,D#,C,O3,G
620 DATAP8,O4,D#,L4,C,L16,C,O3,A
#,O4,C,O3,A#,L8,O4,C,O3,G,L16,O4
,C,O3,A#,O4,C,O3,A#,L8.,O4,C,L16
,C,D#,C,C,O3,A#,O4,L8,C,O3,G,P20
630 DATAT2,O3,L4,A,G,A,O4,C,D,L8
,O3,G,L4,G,L8,F,L4,G,G,L8,F,G,L4
,A,F,G,L8,C,L4,C,L8,C,L4,C,L8,C,
L4,C,L8,C,L4,C
640 DATAA,G,A,O4,C,D,L8,O3,G,L4,
G,L8,F,L4,G,G,L8,F,G,L4,A,F,G,L8
,C,L4,C,L8,C,L4,C,L8,C,L4,C,L8,C
,L4,C,P20
650 DATAT2,L2.,O3,G,L4,O4,D,L2,C
,L4.,O3,B,L8,A,G,F,L2,G,L4,C,L4.
,B,L8,A,G,F,L2,G,L4,C,L2.,D
660 DATAL4,E,L2.,C,L4,G,L4.,E,L8
,D,L2.,C,L4,G,L4.,E,L8,D,L4,C,E,
G,L8,O4,C,L3,O3,B,L8,A,B,L3,A,L8
,G,L2.,A,P20
670 DATAT2,L8,O3,A,B,A,G,L2,A,P4
,L8,A,B,A,G,G,L1,E,P4,L8,O4,C,C,
C,C,C,L2,C,P4,L8,C,C,C,L4,C,L1,O
3,B,P20
680 DATAT2,L4,O3,G,L8,F,L3,F,P6,
L8,A,B,O4,C#,D,E,F,L6,E,L16,D,L2
,D
690 DATAL8,D,D,C,O3,A#,A,G,L4,A#
,L8,A,L4,A,G,F,L8,A,L4,G,L8,D,L4
,F,L8,A,L3,A,P20
700 DATAT2,O3,L2,A,G,L8,G,A,O4,C
,O3,B,A,G,L1,E,L8,D,E,G,E,G#,E,L
2,B,A,L16,D,E,L4.,D,L8,C,L1,E
710 DATAL8,C,E,L2,A,G,L8,G,A,O4,
C,O3,B,A,G,L1,E,L8,D,E,G,E,G#,E,
L2,B,A,L16,D,E,L4.,D,L8,C,L1,E,P
20
720 DATAT4,O3,L4,G,A,G,F,E,F,L2,
G,L4,D,E,L2,F,L4,E,F,L2,G,L4,G,A
,G,F,E,F,L2,G,D,G,L4,E,L3,C,P20
730 DATAT2,L8,O3,F#,L4,F#,L8,G,L
4,A,A,L8,G,L4,G,P6,L8,G,L4,G,L8,
A,B,L4,B,L2.,A,L8,F#,F#,F#,E,L4,
D,L8,E,D,L2.,C,L8,O2,B,B,L4,O3,D
,E,E,L2.,D,P20
740 DATAT2,L8,O3,C,D,F,F,O4,C,O3
,L2.,A,L8,A#,O4,L1,C,L4,E,D,C,O3
,L4.,A,L8,G,L2,F,L8,F,O4,E,F,F,D
,C,L4.,O3,A,L8,A#,L2,G,L8,C,D,F,
F,O4,C,O3,L1,A,P20
750 DATAT1,L8,O3,E,D,F,L16,E,L4,
E,L8,E,D,F,L16,E,L4,E,L8,E,D,F,L
16,E,L4,E,L8,D,C#,E,L16,D,L4,D,L
8,D,C#,E,L16,D,L4,D,L8,C
760 DATAO2,B,O3,D,L16,C,L4,C,L8,
O2,B,A,O3,C,L16,O2,B,L4,B,L8,B,A
,O3,C,L16,O2,B,L4,B,P20
770 DATAT2,L2,O2,B,L4,O3,D#,E,L3
,F#,L4,D#,O2,B,L2,O3,G,L4,F#,E,L
2,B,P25,L4,B,L2,O4,C,L4,O3,B,A,L
2,B,L4,A,G,L2,F#,L4,G,F#,L2,E,P2
0
780 DATAT2,L8,O3,G,L3,G,L8,G,L3.
,G,P8,L8,G,L4,O4,C,O3,C,L8,D#,L4
,F,L2.,F,L8,O3,G,L3,G,L8,G,L3,G,
P4,L8,G,L4,G,G,A,B,L8,O4,C,L4,D#
,D#,P20
790 DATAT3,O3,L8,E,G,L4,G,G,E,A,
L2,G,L8,D,E,G,L4,G,G,A,L2,E,L8,E
,L4,F,F,L8,F,L4.,G,L4,A,G,L8,E,L
4,D,L8,C,L1,C,L8,C,E,L4.,G,L8,G,
G,L4,G,A,L2,G
800 DATAL8,C,D,L4,E,L8,D,L4,D,L8
,C,L2,D,L8,C,L4,F,L8,F,L4,F,F,A,
L8,A,L4,A,O4,C,O3,L8,A,L2,G,P20
820 DATAT2,O3,L8,A,A#,L4.,O4,C,L
8,C,L4,C,L8,C,L4.,C,O3,L8,A#,L4,
A,L8,A#,O4,C,L4,C,O3,A#,A,L2.,F,
L8,F,L4,A#,A#,L8,A,L4,F,L2.,C
830 DATAL8,C,L4,C#,C#,F,L8,O4,C,
O3,F,L2.,G,L8,A,A#,L4.,O4,C,L8,C
,L4,C,L8,C,L4.,C,L8,O3,A#,L4,A,L
8,A#,L4,O4,C,L8,C,C,O3,A#,A,A,L2
.,F,P20
850 DATA T3,O3,L2,E,L4,E,L8,B,L2
,B,L8,B,L4.,F#,L8,G,L4,F#,L1,E,L
4,B,O4,D,L2,E,L4,D,O3,B,O4,C#,O3
,A,L1,B
860 DATAO4,L4,E,L2,E,L4,E,L2,D,L
4,O3,B,B,A,G,L8,F#,L1,D,L2,E,L4,
B,L2,A,L4,G,F#,E,D,L1,E,P20
```

SUMMER ROUNDUP

GRAPHIC ADVENTURE GAMES (disk only)
Darkmoor Hold 29.95
Dragon Blade 29.95
Hall of the King .... 39.95+
Hall of the King II .... 39.95+
Scepter of Ursea 24.95
To Preserve Quandic .... 34.95+
(+ two disk adventure)

UTILITIES
Colorkit 29.95*
Disk Manager 19.95
Disk to Tape 19.95
Disk Zapper 29.95
Maillist (disk only) 29.95
Microartist 19.95*
Oracle 24.95
RomFree 19.95
RTD Trio 44.95

GRAPHIC SIMULATIONS/ARCADE
City War 19.95*
Flight 19.95*
Gravitor 14.95*
Jumbo Jet 19.95*
Warp Factor X 34.95

MISCELLANEOUS (disk only)
Airnav (flight plans) 59.95
Color Disk Trivia 24.95
Trivia Question disks 9.95
IQ Test 9.95
Fantasy Gamer's Pack 19.95

GENEALOGY/ASTROLOGY
Family-Tree 24.95*
Super Astrology 19.95*

TEXT SIMULATIONS/ADVENTURES
Adventure in Wonderland 19.95*
Gangbusters 14.95*
Viking II 19.95*

EDUCATION
Mathpac 14.95*
Music Reader 29.95*
Phonics I & II 14.95*
Preread 1, 2, 3 .... 14.95*
Spelling w/voice 19.95*
***ADD $5.00 FOR DISK VERSION**

PROTECTION POLICY — We believe our customers are honest — all of our software can be backed up using standard procedures.

YOUR PERSONAL CHECK IS WELCOME — no delay. Include $1.50 for shipping for each order + $2.00 for COD. AZ residents add 5% sales tax. Orders shipped within two days.

DEALERS AND AUTHORS INQUIRES are always welcome. Canadian dealers should contact Kelly Software Dist., Ltd., P.O. Box 11932, Edmonton, Alberta T5J 3L1, (403) 421-8003

SUMMER SALES PRICES GOOD ON ORDERS RECIEVED BY AUGUST 31, 1986
SEND FOR OUR FREE CATALOG OF GREAT COCO PROGRAMS
FOR QUESTIONS OR ORDERS CALL 602-749-2864

PRICKLY-PEAR SOFTWARE
QUALITY PROGRAMS FOR YOUR COCO

MasterCard VISA

SEND ORDER TO:
PRICKLY PEAR SOFTWARE
2640 N. CONESTOGA AVE.
TUCSON, ARIZONA 85749

```
880 DATAT2,L4,O3,D,L8,D,L4,G,A,L
3,B,P50,L8,B,L4,B,L8,B,L4,O4,C,O
3,A,L8,G,L3,A,P15,F,L8,F,A#,L4,O
4,C,D,P15,L8,D,L4,D,L8,D,L4,D#,L
3,C,L8,O3,A#,L2,O4,C,P20
900 DATAT2,L16,O3,G,L8.,G,L16,E,
L2,G,L8,E,L4.,C,L16,G,L8,A,L4,G,
L16,G,L8.,G,L16,E,L4,F,F,L8,D,L4
.,O2,B,L16,O3,G,L8,A,L4,G,L16,G,
L8.,G,L16,E,L2,G,L8,E,L4.,C,L16,
G,L8,A,L4,G
910 DATAL16,G,L8.,G,L16,G,L4,G,G
,F,D,L2,C,P20
930 DATAT3,L4,O4,C,C,C,D,D,O3,B,
A,L2.,G,O4,L4,C,C,C,F,F,E,C,D,L8
,E,D,L2.,C,L4,C,C,C,D,D,O3,B,A,L
2.,G,O4,L4,C,C,C,F,F,E,C,D,L8,E,
D,L2.,C,P20
950 DATAT3,L4,O3,E,F,L2.,G,L8,A,
G,A,L2.,G,L4,G,G,A,G,F,E,D,L2.,E
,L8,F,E,F,L2.,E,L4,E,E,F,E,D,C,O
2,B,O3,L2.,C,L8,D,C,O2,B,L2.,O3,
C,L2,C,L8,D,C,D,L4,C,L2.,A,L1,O4
,C,P20
970 DATAT2,L8,O3,E,G,A,O4,C,O3,B
,A,L2,A,L8,E,G,A,O4,C,O3,B,A,L2,
A,L8,A,A,O4,C,E,D,E,L4,E,L8,O3,A
,O4,D,C,O3,A,G,A,L4,A,L8,O4,C,D,
L4,C,L8,O3,A,G,A,L2,A,P20
990 DATAT2,O4,L2,C,O3,L8,B,O4,C,
L4,D,C,O3,L4.,B,L8,F#,L2.,G#,L4,
O4,E,L2.,D,L2.,O3,A,L8,F,G,L4,G#
,A#,A#,O4,C,L2.,C
1000 DATAC,O3,L8,B,O4,C,L4,D,C,O
3,L4.,B,L8,F#,L2.,G#,O4,L4,E,L2.
,D,O3,A,L8,F,G,L4,G#,A#,A#,O4,C,
L2.,C
1010 DATAP8,L2,C,C,L8,G,G,G,G,L4
,G,L8,G,F,E,L4,D,L8,C,O3,B,O4,L2
,C,C,P20
1030 DATAT2,O4,L8,D,C,C,O3,A,O4,
L4,C,O3,L8,A,O4,L4,C,O3,L4.,A,P3
0,O4,L8,D,D,C,L4,C,L8,C,L2.,O3,A
1040 DATAO4,L8,D,D,C,O3,A,A,F,G,
F,G#,L4,G,F,L8,F,F,L4,A,L8,G,F,G
,F,D,L2,F,L8,F,F,G#,G#,G,F,G,G,L
4,F,L2.,F
1050 DATAL8,D,C,L2.,A,L8,G,E,L2,
F,O4,L2,C,O3,L8,A,A#,G,A#,A,L4,F
,A,L8,O4,C,C,D,C,O3,A,F,G,L4,G,L
2,F,L4,A,L8,G,F,G,L4,G,L2,F,P20
1070 DATAT2,L8,O3,G,L4.,A,O4,L4,
C,O3,L8,B,L4,G,D,L8,E,E,L4,G,A,G
,O4,C,O3,L8,B,L4,G,D,E,L8,G,L4.,
A,L8,G,L4,O4,C,L8,O3,B,L4,A,G,O4
,C,O3,L8,B,L4,A,G,L2,A
1080 DATAL8,G,L4,A,O4,C,L8,O3,B,
L4,G,L8,D,D,L4,E,L8,G,L4,A,G,O4,
C,O3,B,L8,G,D,L4,D,L8,E,E,G,L4,A
,L8,G,O4,L4,C,O3,B,A,G,O4,C,O3,B
,G,B,A
1090 DATAO4,D,L2,D,L4,O3,B,B,O4,
C,O3,L8,B,L4.,G,L4,O4,D,L8,C,O3,
L4,B,O4,D,C,L8,O3,B,L4.,G,O4,L4,
D,L8,C,O3,L4,B,O4,D,L8,C,L4.,O3,
B,L4,A,L8,G,L4.,A,P20
1110 DATAT2,L4,O3,F,L8,G,L4,A,G,
L8,A,A#,L4,A,G,F,G,L8,A,L4,G,F,L
8,A,L2,G
1120 DATAO4,L4,C,L8,O3,A,L4,G,A,
O4,L8,C,O3,A#,L4,A,G,F,L8,G,A,L4
,G,F,L8,A,L2,G,P20
1140 DATAT1,L8,O2,G,L4.,O3,C,L8,
G,L4.,F,L8,C,D#,F,L8.,D,L16,O2,A
#,L4.,O3,C,L8,G,L4.,A#,L8,A,A#,O
4,C,L8.,O3,A,L16,F,L2,G
1150 DATAL8,G,A#,O4,D,L8.,C,L16,
O3,G,L4,G,L8,O4,C,O3,G,O4,C,L8.,
D,L16,O3,G,L2,G,L8,F,G,G#,A#,L8.
,G,L16,D#,L8,F,G,L8.,D#,L16,C,L2
.,D,P20
1170 DATAT4,L1,O3,G,L2.,G,L4,F#,
G,L2.,A,L4,G,L2,A,L4,G,A,L2,G,L4
,F#,L1,F,A,L2.,A,L4,G#,A,L2.,B,L
4,A,L2,B,L4,A,B,L2,A,L4,G#,L1,G,
P20
1190 DATAT2,O3,L4,D,E,C#,P22,C,D
```

● **COLOR BANKBOOK** $19.95

● **BUSINESS BANKBOOK**
SYSTEM ONE
FOR ONE DISK DRIVE
$49.95
SYSTEM TWO
FOR TWO DISK DRIVES
$49.95

● **SUPERDISK UTILITY**
$ 9.95

● **RADIOLOG** $ 9.95

● **CODE PRATICE** $ 9.95

CALL 1-800-628-2828
EXTENSION 552

ALL PROGRAMS INCLUDE MANUALS ,
REQUIRE 32K AND 1 DISK DRIVE.
ADD $2.00 SHIPPING & HANDLING
FLORIDA RES. ADD 5% SALES TAX

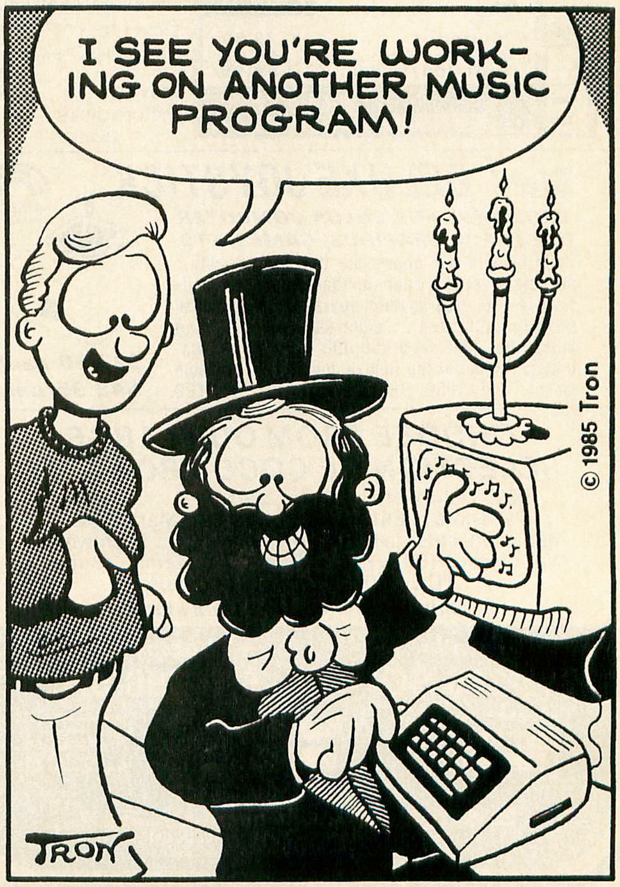
SUNRISE
SOFTWARE

RAINBOW CERTIFICATION SEAL

8901 NW 26 ST DEPT R
SUNRISE, FL 33322

```
,O2,B,P22,L8,O3,D,E,L4,C#,L8,C,C
,D,O2,B,P22,O3,D,D,D,E,C#,C#,C#,
E,C,L4,C,O2,B
1200 DATAO3,L8,C,O2,B,O3,C,O2,B,
O3,C,O2,B,O3,C,O2,B,O3,C,O2,B,L4
,O3,C,C,P22,L16,O2,B,L8,O3,D,D,C
#,L4,C#,P22,L8,O2,A,O3,C,D,O2,L1
6,B,A,L4,G,L8,O3,D,E,L4,C#,L8,C,
L4,D,O2,B
1210 DATAO3,L8,D,D,D,E,C#,C#,C#,
O2,A,P22,L16,A,O3,C,L8,D,O2,B,P2
2,O3,C,O2,B,O3,C,O2,B,O3,C,O2,B,
O3,C,O2,B,O3,C,O2,B,O3,C,O2,B,L4
,O3,C,P20
1230 DATAT3,O3,L16,D#,L8,E,L16,G
,L8,A,O4,L4,C,O3,B,A,G#,G,G#,A,P
22,L8,G,G,L4,G#,A,A#,B,P22,O4,C,
O3,B,A,G#,G,G#,A,P22,L8,G,G,L4,G
#,A,B,O4,C,P20
1250 DATAT2,O4,L2,C,O3,G,L8,G,L4
,A,L8,G,F,L2,E,C,L8,G,L4,A,L8,G,
A,L2,B,L3,G,L8,E,L4,F,L8,F,F,E,L
4,D,L2,C,P20
1270 DATAT2,L8,O3,C,F,G,L2,A,L8,
A,G,F,L2.,A,L8,A,A#,O4,C,L2.,O3,
A#,L8,A#,F,L2.,G,O2,L8,A#,O4,L2.
,C,L8,D#,C,O3,G#,L2.,A#
1280 DATAL8,A#,A#,A#,L2.,A,L8,D,
E,F#,G,A,L2.,B,L8,B,L2.,A#,L8,D#
,F,G,G#,A#,O4,L4,C,L4.,O3,G,O4,L
8,E,D,C,O3,L4.,A#,A,L8,A,L2.,F,L
8,F,L4,G,L8,E,L2.,F,P20
1300 DATAT2,O3,L4,C,L8,D,L4,E,L8
,C,L4,E,C,L2,E,L4,D,L8,E,F,F,E,D
,L2,F,L4,E,L8,F,L4,G,L8,E,L4,G,E
,L2,G,L4,F,L8,G,A,A,G,F,L2,A
1310 DATAL4,G,L8,C,D,E,F,G,L2,A,
L4,A,L8,D,E,F,G,A,L2,B,L4,B,L8,E
,F,G,A,B,L2,O4,C,L4,C,L8,O3,B,L4
,A,F,B,G,O4,L2,C,O3,L8,C,D,E,F,G
,A,B,O4,L4,C,P20
1330 DATAT2,O4,L4,C,O3,A,F,C,L8,
D,E,F,L4,D,L6,F,L4,C,G,O4,C,O3,A
,F,L8,D,E,F,L4,G,L6,A,L4,G
1340 DATAA,L8,A#,A,G,L4,O4,C,O3,
A,L8,G,L4,F,G,L3,A,L8,F,L4,D,L8,
F,D,L4,C,C,F,L8,A,L4,G,L8,C,L4,F
,L8,A,L4,G,L8,A,A#,O4,C,O3,A,F,L
4,G,L8,C,L3,F,P20
1360 DATAT2,L4,O3,G,A,L4,B,L8,G,
L2.,E,L4,A,L8,F#,L2.,D,L4,G,L8,E
,L4,C,G,E,L8,C,L4,E,G,L4,F#,L2,D
1370 DATAL8,G,A,L4,B,L8,G,L2.,E,
L4,A,L8,F#,L2.,D,L4,G,L8,E,L4,C,
G,E,L8,C,L4,E,G,L1,G,P20
1390 DATAT2,L8,O2,B,O3,C,L16,D,L
8.,D,L8,D,L16,E,L6,D,L16,C,L8,O2
,B,O3,C,D,D,D,L16,E,L8,G,P8,G,A,
B,A,G,L16,E,L8,B,A,G,L16,G,L8,E,
L4,D
1400 DATAL16,O2,B,L8.,O3,C,L16,D
,L8.,D,L8,D,L16,E,L6,D,L16,C,L8,
O2,B,O3,C,D,D,D,L16,E,L8,G,P8,G,
A,B,A,G,L16,G,L8,B,G,G,A,L2,A,P2
0
1420 DATAT2,O3,L2.,F,O4,C,L4.,D,
L8,C,O3,L4,A#,O4,L2.,C,O3,L8,F,F
,L4.,F,L8,D,L4,F,D,L2,C,L8,A,O4,
C,L2,D,L8,C,O3,A,O4,L2,C
1430 DATAO3,L8,A,F,L4,G,L4.,F,L8
,D,L2.,F,L8,G,A,F,F,L4,F,L2,F,L2
.,F,P20
1450 DATAT2,O3,L8,C,D,F,D,L4,A,C
,L2,C,L8,C,D,F,D,L4,A,C,L2,C,L8,
A#,A,A,G,L4.,G,L8,D,A#,L4,A,L8,A
#,A,L4.,G
1460 DATAL8,A#,A,A,A,L4.,G,L8,C,
A#,L4,O4,C,O3,A,L8,G,P8,C,D,F,D,
L4,A,C,L2,C,L8,C,D,F,D,L4,A,C,L2
,C
1470 DATAL8,A#,A,A,G,L4.,G,L8,D,
L4,A#,L8,A,L4,A,G,L8,D,A#,O4,C,O
3,A#,A,L4.,G,L8,C,A#,A,G,L4,A#,L
8,O4,C,O3,A,A,L4,G,F,P20
1490 DATAT2,O3,L4,D,E,L2,B,L4,A,
G,L2,E,L4,D,E,L2,B,L4,A,D,L2,B,L
4,D,L8,E,D,L4,F#,L8,E,L4.,F#,L8,
```

LOOSE STRINGS / by Tron


I SEE YOU'RE WORKING ON ANOTHER MUSIC PROGRAM!
© 1985 Tron
TRON

CINSOFT
PROGRAMS • PERIPHERALS • SUPPLIES • SERVICE

For Coco . . .
in the Midwest

Now in our 4th year!

New Catalog Now Available
CALL OR WRITE

New for 86. . .

star
NX-10
Outstanding Near-Letter Quality
New streamlined appearance
Front panel operation
5K buffer
Cassette ribbon
Auto paper feed
Rear tractor feed
Cut sheet feeder available

Printer Only $319.00
with Metric Industries Model 104 interface $349.00
"Authorized Star Micronics Service Center"

Coco Max
The Complete . . .
CoCo Max II System
includes . . .
Deluxe Joystick and Y-cable !! $ 119.95
CocoMax II .... $ 79.95
with Y-cable 99.95
with Joystick 99.95

LATEST VERSION FEATURES . . .
•14 fonts
•Shrink, Stretch Rotate
•Multiple drives
•Pattern Save
UPGRADES AVAILABLE
Disk I to II 20.00
Tape I to Disk II 25.00
Max Edit 19.95
Picture disks available

New! DELUXE JOYSTICK
EXCELLENT FOR COLOR COMPUTER
USE IT FOR GRAPHICS, GAMES, ETC.
CoCo owners will appreciate this high quality, durable joystick. Open gimbal design ... self-centering or free-floating operation. Mechanical trims on both axes ... eight foot cable ... firing button has lifetime 5,000,000 presses. A two-button version of the Deluxe Joystick is available for the Tandy 1000. DEALER INQUIRIES INVITED
RAINBOW CERTIFICATION SEAL
$27.50 each
$49.95/pair

CHOOSE FROM OUR LARGE SELECTION OF COCO PRODUCTS
B5 ... Colorware ... Deft ... Derringer ... Diecom ... Dynacaic ... Elite ... HJL ... J & M ... Mark Data ... Metric Industries ... Michtron ... Microcom ... Microworks ... Tom Mix ... PBJ ... PXE ... Speech Systems ... Sugar ... TCE ... VIP ... Zebra ... and more!
Shipped immediately from stock!

• Call •
513-396-SOFT
• Shop by Modem •
513-396-SHOP

VISA MasterCard AMERICAN EXPRESS

• Write •
2235 Losantiville, Cincinnati, OH 45237
SHIPPING will be charged at our ACTUAL COST
Ohio residents add 5 5% Sales Tax COD add 2 00

```
F,F,F,F,L4,G,A,L1,E
1500 DATAL4,D,L8,E,D,L4,F#,L8,E,
L4,F#,L8,F,F,F,F,L4,G,A,L1,E,L4,
G,L8,A,G,L4,B,L8,A,L2,B,L8,B,B,B
,B,L4,O4,C,D,D,L8,O3,B,L2,B
1510 DATAL8,B,B,B,B,L4,O4,C,D,O3
,B,L8,A,L2,G,L8,B,B,B,B,L4,O4,C,
D,L1,O3,G,P20
1530 DATAT2,O3,L2,A,L4.,F,L8,A,A
#,A,G,L4.,A,L8,A,A#,A,G,L4,A,L8,
G,F,L4,G,L16,E,D,L2,C,L8,A,O4,C,
L2,D,L4.,C,O3,L8,A,A#,A,G,L4,A,L
8,A,A#,A,G,L4,A,L8,G,F,L2,E,P20
1550 DATAT2,L2,O3,G,L8,A,B,O4,C,
O3,B,O4,C,O3,L4,B,L8,A,L4,B,L8,O
4,C,O3,B,O4,C,O3,L4,A,L8,A,B,O4,
L2,C,O3,L8,E,G#,L8,B,O4,L4.,C,L4
.,E,O3,L8,B,L4.,B,O4,L16,C,O3,B,
L4,A
1560 DATAL4.,G,L16,A,G,L4.,F#,L2
,G,L8,A,B,O4,C,O3,B,O4,C,O3,L4,B
,L8,A,L4,B,O4,L8,C,O3,B,O4,C,L4,
O3,A,L8,B,O4,C,L8,O3,B,O4,C,L4,O
3,A
1570 DATAP8,L8,G,A,A#,A,A,L4,A,L
8,G,A,A#,O4,L4,G,D,L8,C,O3,A#,L4
.,A#,O4,C,L8,O3,A#,A,L4.,A,L8,D,
B,G,L4.,G,P20
1580 DATA"CHILDREN'S TUNES"
1590 DATA 12,84,72,73,83,32,79,7
6,68,32,77,65,78
1600 DATA 42,79,78,69,32,76,73,8
4,84,76,69,32,84,87,79,32,76,73,
84,84,76,69,32,84,72,82,69,69,32
,76,73,84,84,76,69,32,73,78,68,7
3,65,78,83
1610 DATA 18,83,69,83,65,77,69,3
2,83,84,82,69,69,84,32,83,79,78,
71
1620 DATA 17,73,84,90,89,32,66,7
3,84,83,89,32,83,80,73,68,69,82
1630 DATA 19,80,79,80,32,71,79,6
9,83,32,84,72,69,32,87,69,65,83,
69,76
1640 DATA 21,82,73,78,71,32,65,8
2,79,85,78,68,32,84,72,69,32,82,
79,83,73,69
1650 DATA 22,77,65,82,89,32,72,6
5,68,32,65,32,76,73,84,84,76,69,
32,76,65,77,66
1660 DATA 27,84,87,73,78,75,76,6
9,32,84,87,73,78,75,76,69,32,76,
73,84,84,76,69,32,83,84,65,82
1670 DATA"ANOTHER TIME...ANOTHER
 PLACE"
1680 DATA 12,71,85,65,78,84,65,7
```

```
8,65,77,69,82,65
1690 DATA 18,83,85,77,77,69,82,3
2,73,78,32,84,72,69,32,67,73,84,
89
1700 DATA 31,68,79,32,89,79,85,3
2,75,78,79,87,32,84,72,69,32,87,
65,89,32,84,79,32,83,65,78,32,74
,79,83,69
1710 DATA 10,77,79,79,78,32,82,7
3,86,69,82
1720 DATA 18,67,65,76,73,70,79,8
2,78,73,65,32,68,82,69,65,77,73,
78
1730 DATA 9,89,69,83,84,69,82,68
,65,89
1740 DATA 15,84,72,69,32,87,65,8
9,32,87,69,32,87,69,82,69
1750 DATA 14,76,79,78,68,79,78,3
2,66,82,73,68,71,69,83
1760 DATA"LOVE SONGS"
1770 DATA 21,73,70,32,73,32,87,6
9,82,69,32,65,32,67,65,82,80,69,
78,84,69,82
1780 DATA 21,87,69,39,86,69,32,7
9,78,76,89,32,74,85,83,84,32,66,
69,71,85,78
1790 DATA 15,84,72,69,32,87,65,8
9,32,79,70,32,76,79,86,69
1800 DATA 16,65,78,78,73,86,69,8
2,83,65,82,89,32,83,79,78,71
1810 DATA 26,84,72,73,83,32,71,8
5,89,83,32,73,78,32,76,79,86,69,
32,87,73,84,72,32,89,79,85
1820 DATA 19,73,32,72,79,78,69,8
3,84,76,89,32,76,79,86,69,32,89,
79,85
1830 DATA 2,73,70
1840 DATA 16,83,67,65,82,66,79,8
2,79,85,71,72,32,70,65,73,82
1850 DATA "AS THE WORLD TURNS"
1860 DATA 14,85,80,32,85,80,32,6
5,78,68,32,65,87,65,89
1870 DATA 37,72,69,39,83,32,71,7
9,84,32,84,72,69,32,87,72,79,76,
69,32,87,79,82,76,68,32,73,78,32
,72,73,83,32,72,65,78,68,83
1880 DATA 31,89,79,85,32,65,82,6
9,32,84,72,69,32,83,85,78,83,72,
73,78,69,32,79,70,32,77,89,32,76
,73,70,69
1890 DATA 28,89,79,85,32,65,78,6
8,32,77,69,32,65,71,65,73,78,83,
84,32,84,72,69,32,87,79,82,76,68
1900 DATA 17,65,73,78,39,84,32,7
8,79,32,83,85,78,83,72,73,78,69
1910 DATA 22,84,72,69,32,65,73,8
```

MicroWorld

230 Moorestown Rd. Wind Gap, PA 18091
(215) 759-7662

Call or write for Price List

LOW PRICES ON 100% Radio Shack Equipment

(with full warranty)

New Slimline Drive 0	**$210.00**
Slimline Drive 0 & 1 installed	**$399.00**

Prices subject to change!

Prices include shipping!

64K Extended	**$169.00**
Sakata 13" Monitor	**$180.00**
With monitor driver	**$210.00**
Multipack Interface	**$ 75.00**
DMP-105	**$159.00**
DMP-130	**$275.00**
64K Upgrade (150 NS) Top of the line	**$29.95**
Diskettes, any quantity, lifetime Warranty	**$ 1.50**
Tandy 1000	**$695.00**

Quantities are limited!

10% off Computerware
10% off all Radio Shack Sale Items
15% off Radio Shack Hardware
20% off all Radio Shack Software

1986
BEST OF THE UPGRADES LIST

1. Memory	64K DRAMS . . . from	$ 19
	256K Kits	98
2. ROM/BASIC	Color Basic 1.2	$ 19
	Extended Basic 1.1	29
	Disk Basic 1.1	29
	ADOS	40
3. Storage	Drive 0	$209
	Drive 1 (external)	135
	Drive 1 (internal)	80
4. Controllers	J&M (you supply DOS)	$ 89
	'Super Controller'	95
5. Monitor Driver	Original Coco	$ 24
	Coco II	34
6. Monitors	Hi-Res Green/Amber	$ 89
	Color with audio	169
7. Lower Case Kit		$ 49
8. Deluxe Keyboards	from	$ 59

Please specify model or cat # of your CoCo when ordering. Brands and prices subject to stock availability. Send for free price list on over 200 Coco items.

master charge VISA

POLYGON COMPUTERS
1316 Wilshire Blvd., Suite 206
Los Angeles, CA 90017
(213) 483-8388

Ca. Res. 6½% tax
Visit our Retail Store

Shipping: $2 Software
Charges: $5 Hardware

```
2,32,84,72,65,84,32,73,32,66,82,
69,65,84,72,69
1920 DATA 16,74,79,89,32,84,79,3
2,84,72,69,32,87,79,82,76,68
1930 DATA 14,79,78,32,65,32,74,6
9,84,32,80,76,65,78,69
1940 DATA "OLD FAVORITES"
1950 DATA 23,84,72,69,32,76,73,7
9,78,32,83,76,69,69,80,83,32,84,
79,78,73,71,72,84
1960 DATA 6,69,88,79,68,85,83
1970 DATA 17,66,69,69,82,32,66,6
5,82,82,69,76,32,80,79,76,75,65
1980 DATA 14,83,80,73,78,78,73,7
8,71,32,87,72,69,69,76
1990 DATA9,65,76,76,69,89,32,67,
65,84
2000 DATA 9,66,79,82,78,32,70,82
,69,69
2010 DATA 15,67,79,76,79,85,82,3
2,77,89,32,87,79,82,76,68
2020 DATA 9,68,79,32,65,32,68,69
,65,82
2030 DATA"WOMEN"
2040 DATA 5,68,65,73,83,89
2050 DATA 21,72,69,89,32,84,72,6
9,82,69,32,76,79,78,69,76,89,32,
71,73,82,76
2060 DATA 10,73,32,65,77,32,87,7
9,77,65,78
2070 DATA 4,74,69,65,78
2080 DATA 5,77,65,78,68,89
2090 DATA 15,77,89,32,67,72,69,8
2,73,69,32,65,77,79,85,82
2100 DATA 7,67,69,67,73,76,73,65
2110 DATA 23,84,72,69,32,77,79,8
3,84,32,66,69,65,85,84,73,70,85,
76,32,71,73,82,76
3000 DATA"A CHILDREN'S COUNTING
AND RHYMING SONG"
3005 DATA"YOU CAN'T SING THIS IF
 YOU CAN'T COUNT TO 10"
3010 DATA"THEME SONG OF A POPULA
R TV SHOW"
3015 DATA"LET YOUR FINGERS DO TH
E WALKING..."
3020 DATA"THE MONKEY INITIATES T
HE CHASE"
3025 DATA"IT MAY NOT MAKE SENSE.
..BUT ALL THE KIDS LIKE IT"
3030 DATA"THIS SONG TELLS OF A V
ERY DEVOTED PET"
3035 DATA"I WONDER WHERE THIS SO
NG CAME FROM"
3040 DATA"A 1960'S TUNE ADAPTED
FROM A SPANISH SONG BY JOSE MART
I"
3045 DATA"WORDS AND MUSIC BY JOH
N SEBASTIAN, STEVE BOONE AND MAR
K SEBASTIAN"
3050 DATA"A DIONNE WARWICK HIT O
F THE 60'S"
3055 DATA"ANDY WILLIAMS EARNED A
 GOLD RECORD WITH THIS ONE IN 19
61"
3060 DATA"RECORDED BY THE MAMAS
AND PAPAS ON DUNHILL RECORDS"
3065 DATA"WORDS AND MUSIC BY JOH
N LENNON AND PAUL MCCARTNEY"
3070 DATA"FROM THE COLUMBIA PICT
URE OF THE SAME NAME"
3075 DATA"WE ALL HAVE TO FALL SO
METIME"
3080 DATA"WORDS AND MUSIC BY TIM
 HARDIN"
3085 DATA"A 170 CARPENTERS HIT"
3090 DATA"MUSIC BY JACK DIEVAL"
3095 DATA"FROM 'THE JOLSON STORY
'"
3100 DATA"SUNG AND MADE FAMOUS B
Y HERB ALBERT ON HIS 1968 TV SPE
CIAL"
3105 DATA"YOU CAN BE SURE I'M TE
LLING THE TRUTH IN THIS SONG"
3110 DATA"LET ME KNOW IF THIS SO
NG BY JOHN ROSTILL SOUNDS FAMILI
AR"
3115 DATA"ADAPTED BY PAUL SIMON
AND ART GARFUNKEL"
3120 DATA"A FIFTH DIMENSION HIT
OF THE 60'S"
3125 DATA"ADAPTED BY GEOFF LOVE"
3130 DATA"WORDS AND MUSIC BY STE
VIE WONDER"
3135 DATA"A HELEN REDDY HIT"
3140 DATA"WORDS AND MUSIC BY BIL
L WITHERS"
3145 DATA"WORDS AND MUSIC BY ALB
ERT HAMMOND AND MIKE HAZLEWOOD"
3150 DATA"THREE DOG NIGHT'S 1971
 HIT"
3155 DATA"PETER, PAUL AND MARY R
ECORDED THIS TUNE BY JOHN DENVER
 IN 1969"
3160 DATA"BASED ON A SONG BY SOL
OMON LINDA AND PAUL CAMPBELL"
3165 DATA"FROM THE MOVIE OF THE
SAME NAME"
3170 DATA"THE OKTOBERFEST WOULDN
'T BE THE SAME WITHOUT THIS ONE"
3175 DATA"WORDS AND MUSIC BY DAV
ID C. THOMAS"
3180 DATA"WHAT'S A WEDDING WITHO
UT THIS SONG?"
3185 DATA"COLUMBIA PICTURES AND
CARL FOREMAN PRESENT..."
```

```
3190 DATA"FROM 'THE BALLET FOR A
 GIRL IN BUCHANNON'"
3195 DATA"FROM 'SOUND OF MUSIC'"
3200 DATA"THIS USED TO BE A STYL
ISH TUNE"
3205 DATA"WORDS AND MUSIC BY EAR
L SHUMAN AND LEON CARR"
3210 DATA"A HELEN REDDY HIT"
3215 DATA"FROM THE 20TH CENTURY-
FOX FILM 'THE PRIME OF MISS JEAN
 BRODIE'"
3220 DATA"BARRY MANILOWS FIRST H
IT SONG"
3225 DATA"WORDS AND MUSIC BY STE
VIE WONDER, HENRY COSBY AND SYLV
IA MOY"
3230 DATA"WORDS AND MUSIC BY PAU
L SIMON"
3235 DATA"WORDS AND MUSIC BY NOR
RIS WILSON, BILLY SHERRIL AND RO
RY BOURKE"
```

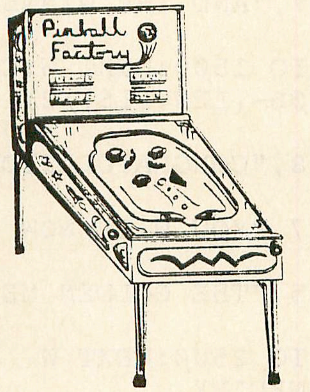
230	251	3110	39
325	157	4080	32
550	66	6000	255
631	56	6100	5
830	145	7055	153
950	194	8080	148
1130	172	10025	97
1301	150	10205	200
1400	133	10325	243
2020	88	END	114

Listing 2: SONGGAME

```
99 CLEAR 5000:PCLEAR 2
100 DIM SPOT(75)
101 CLS
102 W=1
103 PRINT@73,"NAME THAT SONG"
104 PRINT@367,"BY"
105 PRINT@426,"MARGE RUTTER"
106 GOSUB 3030
110 'LOAD ARRAYS
120 OPEN "I",#1,"TITLES/DAT"
130 FOR X=1 TO 6
140 INPUT#1,CA$(X)
150 FOR Y=1 TO 8
160 INPUT#1,SO$(X,Y)
170 NEXT Y
180 NEXT X
190 CLOSE#1
200 OPEN"D",#1,"SONGS/DAT",3
201 DIM NO$(200)
205 DIM ST$(48)
206 ST=0
210 CLS
211 PRINT@41,"NAME THAT SONG"
212 PRINT@73,STRING$(14,45)
215 PRINT@162,"PLAYER#1'S NAME";
220 INPUT P1$
223 PRINT@258,"PLAYER#2'S NAME";
225 INPUT P2$
230 'MELODY ROULETTE
235 'PICK PLAYING AMOUNT
240 CLS
241 PRINT@352,STRING$(32,45)
242 PRINT@96,STRING$(32,45)
243 PRINT@232,"MELODY ROULETTE"
244 PRINT@292,"INSTRUCTIONS? <Y>
 OR <N>
245 I$=INKEY$
246 IF I$<>"Y" AND I$<>"N" THEN
GOTO 245
247 IF I$="Y" THEN GOSUB 10000
250 SPOT(1)=100
255 SPOT(2)=250
260 SPOT(3)=500
265 SPOT(4)=750
270 SPOT(5)=100
275 SPOT(6)=250
280 SPOT(7)=500
285 SPOT(8)=750
286 Y=225
290 FOR X=1 TO RND(20)+8
291 Y=Y-1
292 SOUND Y,1
295 CLS
300 PRINT@352,STRING$(32,45)
305 PRINT@96,STRING$(32,45)
310 PRINT@143,CHR$(133)
315 PRINT@173,SPOT(X)
320 PRINT@202,SPOT(X+7)
325 PRINT@232,SPOT(X+6)
330 PRINT@266,SPOT(X+5)
335 PRINT@301,SPOT(X+4)
340 PRINT@272,SPOT(X+3)
345 PRINT@242,SPOT(X+2)
350 PRINT@208,SPOT(X+1)
355 SPOT(X+8)=SPOT(X)
360 FOR Z=1 TO (15*X):NEXT Z
365 NEXT X
370 MONEY=SPOT(X-1)
375 PRINT@388,"WE'RE PLAYING FOR
 $";MONEY
390 FOR Z=1 TO 500:NEXT Z
400 'PLAY MELODY ROULETTE
410 FOR A=1 TO 2
420 'SELECT RANDOM TUNE
430 TUNE=TUNE+1
440 X=RND(6)
450 GOSUB 4000
460 R=((X-1)*8+Y)*200
465 GOSUB 3000
```

```
470 GOSUB 5000
480 IF C=0 THEN GOSUB 6000 ELSE
CLS:PRINT@261,"TIMES UP...NEXT T
UNE:":FORW=1 TO 500:NEXT W:A=1
530 IF TUNE>=5 AND P1<>P2 THEN A
=2
540 NEXT A
550 IF P1>P2 THEN PL$=P1$ ELSE P
L$=P2$
560 CLS:PRINT@45,PL$
561 PRINT@102,"WINS MELODY ROULE
TTE,"
563 PRINT@169,"10 GAME POINTS,"
564 PRINT@239,"AND"
565 PRINT@297,MONEY;"  DOLLARS"
566 PRINT@451,"PRESS SPACEBAR TO
 CONTINUE"
567 W$=INKEY$:IF W$<>CHR$(32) TH
EN GOTO 567
570 IF PL$=P1$ THEN T1=T1+10 ELS
E T2=T2+10
580 TUNE=0:P1=0:P2=0:F=0:X$="WRO
NG"
600 'TUNE TOPICS
601 CLS
602 PRINT@96,STRING$(32,45)
603 PRINT@352,STRING$(32,45)
604 PRINT@234,"TUNE TOPICS"
605 PRINT@292,"INSTRUCTIONS? <Y>
 OR <N>"
606 I$=INKEY$
607 IF I$<>"Y" AND I$<>"N" THEN
GOTO 606
608 IF I$="Y" THEN GOSUB 10100
609 C$="YES"
610 'SELECT CATEGORY
620 T=RND(6)+20
625 FOR R=1 TO T
630 CLS
631 PRINT@96,STRING$(32,45)
632 PRINT@352,STRING$(32,45)
635 Y=RND(50)+200
640 SOUND Y,1
645 IF X=6 THEN X=0
650 X=X+1
655 PRINT@((111+X*32)-(LEN(CA$(X
))/2)),CA$(X)
660 FOR W=1 TO 50:NEXT W
665 NEXT R
670 PRINT@418,"WE'LL BE HEARING
SONGS FROM:";
675 PRINT@(463-(LEN(CA$(X))/2)),
CA$(X)
685 FOR W=1 TO 1000:NEXT W
690 'PLAY TUNE TOPICS
700 FOR A=1 TO 2
710 'SELECT RANDOM TUNE
720 TUNE=TUNE+1
730 GOSUB 4000
750 R=((X-1)*8+Y)*200
755 GOSUB 3000
760 GOSUB 5000
770 IF C=0 THEN GOSUB 6000 ELSE
CLS:PRINT@261,"TIMES UP...NEXT T
UNE":FOR W=1 TO 500:NEXT W:A=1
825 IF TUNE>=5 AND P1<>P2 THEN A
=2
830 NEXT A
840 IF P1>P2 THEN PL$=P1$ ELSE P
L$=P2$
850 CLS:PRINT@109,PL$
851 PRINT@168,"WINS TUNE TOPICS"
852 PRINT@238 "AND"
853 PRINT@297,"10 GAME POINTS"
854 PRINT@451,"PRESS SPACEBAR TO
 CONTINUE"
855 W$=INKEY$:IF W$<>CHR$(32) TH
EN GOTO 855
860 IF PL$=P1$ THEN T1=T1+10 ELS
E T2=T2+10
870 TUNE=0:P1=0:P2=0:F=0:X$="WRO
NG":C$="NO"
900 OPEN"D",#2,"CLUES/DAT",100
903 'BID-A-NOTE
905 CLS
906 PRINT@96,STRING$(32,45)
908 PRINT@352,STRING$(32,45)
910 PRINT@235,"BID-A-NOTE"
911 PRINT@292,"INSTRUCTIONS? <Y>
 OR <N>
912 I$=INKEY$
913 IF I$<>"N" AND I$<>"Y" THEN
GOTO 912
914 IF I$="Y" THEN GOSUB 10200
915 DIM BI$(25)
920 FOR A=1 TO 2
925 CLS
930 'SELECT RANDOM TUNE
940 TUNE=TUNE+1
950 X=RND(6)
960 GOSUB 4000
970 R=((X-1)*8)+Y
980 GET#2,R
990 INPUT#2,CL$
1000 PRINT@33,"YOUR CLUE IS:"
1001 PRINT@64,CL$
1002 PRINT@128,STRING$(32,45)
1008 BI$(J)="15"
1010 FOR Z=1 TO 2
1020 J=J+1
1030 IF INT(J/2)=J/2 THEN PL$=P1
$ ELSE PL$=P2$
```

The art of entertainment



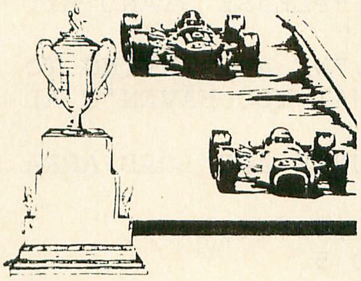
Pinball Factory *by Kary McFadden*

The video game comes full circle in this glorious tribute to the original. Classic pinball spings to life as never before, with fresh new angles that only the computer can offer. Crisp graphics, sound, and fast, smooth action give this machine-language arcade game a realistic, responsive feel you'll hardly believe. There are even "tilt" buttons that let you "bump" the machine!

In addition to playing a great game of pinball, you can enjoy hours of creative pleasure as you design, build, and edit your own screens. Save and load your favorite creations. The joystick-controlled cursor makes it all easy.

Change the board: build with bumpers, tabs, and a multitude of solid obstacles to form any configuration imaginable.
Change the face: draw your own title board with lines, rays, and shape patterns. Add text in three different colors, and two dirrent sizes.
Change the rules: alter the gravity, bounce, and scoring!

64K Color Computer required. $34.95



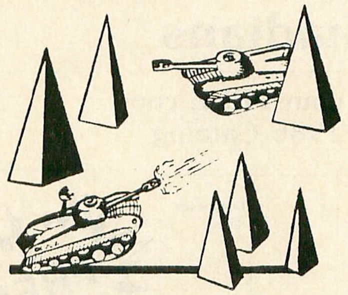
Speed Racer *by Steven Hirsch*

The checkered flag drops as your pulse rises in this lively new arcade game. The road twists to the horizon on the 3-D panorama that sets the stage for the most exciting race the CoCo has ever seen!

Vie for time as you speed through the curves at incredible speeds. Step through the gears to stay ahead of the pack, but step lively since some will stop at nothing to see the end of the race, or the end of you!

Four challenging raceways, complete with obstacles and colorful 3-D scenery, put your skills to the test in this Pole Position™ type game.

32K Color Computer required. $34.95



Rommel 3-D *by Kary McFadden*

You clutch the tank controls, searching for any sign of the enemy. Suddenly a blip appears on radar! Frantically, you move your tank into position. At last you spot the elusive enemy tank! Facing it, you race to lock sights and fire before he does!

Enter the ultimate battle-zone in this exciting 3-D tank combat game. Strategy, speed, and your tank's cannon are your only hope as you wind through a three-dimensional course inhabited by impenetrable barriers and enemy tanks.

Dazzling graphics and lifelike sound take you a step beyond the ordinary in this fast, machine-language arcade game. Enter the next dimension, ROMMEL'S troops are waiting for you!

32K Color Computer required. $29.95

MichTron

576 S. Telegraph, Pontiac, MI 48053
Orders and Information (313) 334-5700
Prices Do Not Include Shipping and Handling

```
1040 PRINT"YOUR BID PLEASE ";PL$
;
1050 INPUT BI$(J)
1060 IF LEFT$(BI$(J),1)="P" THEN
 Z=2 ELSE Z=1
1070 NEXT Z
1080 IF PL$=P1$ THEN PL$=P2$ ELS
E PL$=P1$
1090 R=((X-1)*8+Y)*200
1100 PRINT STRING$(32,45)
1101 PRINT" YOUR CLUE WAS:"
1102 PRINT CL$
1110 PRINT "HERE ARE YOUR ";BI$(
J-1);" NOTES ";PL$
1111 FOR W=1 TO 2000:NEXT W
1115 GOSUB 3000
1120 FOR K=1 TO VAL(BI$(J-1))
1130 GET#1,R
1140 INPUT#1,NO$
1150 PLAY NO$
1160 R=R+1
1165 IF INSTR(1,"#ABCDEFG",RIGHT
$(NO$,1))=0 THEN K=K-1
1170 NEXT K
1180 GOSUB 6000
1230 NEXT A
1240 IF P1>P2 THEN PL$=P1$ ELSE
PL$=P2$
```

Canadians

Send for your FREE copy
of our 1986 Catalog

Kellynews
VOL 3
1986
FREE
KELLY SOFTWARE DISTRIBUTORS LIMITED
SOFTWARE FOR THE COLOR COMPUTER

Kellynews Vol-3 is now available and contains news, hints, programs and articles from the crew at Kelly Software. We are Canada's largest national distributor of Color Computer products and we stock all the latest games, utilities, simulations and business programs. We encourage all Canadian Color Computer owners and Dealers to send for our FREE catalog.

Kelly Software Distributors Ltd.
P.O. Box 608, Station T
Calgary, Alberta T2H 2H2
Tele: (403) 236-2161

```
1260 IF PL$=P1$ THEN T1=T1+20 EL
SE T2=T2+20
1270 IF T1>T2 THEN PL$=P1$ ELSE
IF T2>T1 THEN PL$=P2$ ELSE GOSUB
 7000
1280 CLS
1281 PRINT@197,"AND THE WINNER I
S....."
1282 FOR W=1 TO 1500:NEXT W:CLS
1283 PRINT@(206-(LEN(PL$)/2)),PL
$;"!!!"
1284 PRINT@328,"CONGRATULATIONS!
"
1285 PRINT@387,"YOU WILL NOW GO
ON ALONE TO"
1290 PRINT@455,"THE GOLDEN MEDLE
Y!"
1295 FOR W=1 TO 2500:NEXT W
1300 'GOLDEN MEDLEY
1301 CLS
1302 PRINT@96,STRING$(32,45)
1303 PRINT@352,STRING$(32,45)
1304 PRINT@233,"GOLDEN MEDLEY"
1305 PRINT@292,"INSTRUCTIONS? <Y
> OR <N>"
1306 I$=INKEY$
1307 IF I$<>"Y" AND I$<>"N" THEN
 GOTO 1306
1308 IF I$="Y" THEN GOSUB 10300
1309 CLS
1310 PRINT@198,"PLEASE STAND BY.
...."
1311 PRINT@355,"WE ARE TRYING TO
 FIND 5 SONGSTHAT YOU HAVEN'T AL
READY HEARD."
1315 'PICK 5 TUNES AND LOAD ARRA
YS
1320 DIM GM$(5),N2$(5,175)
1330 FOR K=1 TO 5
1335 C$="NO"
1340 GOSUB 4000
1345 GM$(K)=TUNE$
1350 R=((X-1)*8+Y)*200
1360 F=0
1370 FOR C=1 TO 2
1380 F=F+1
1390 GET#1,R
1400 INPUT#1,N2$(K,F)
1410 IF N2$(K,F)="P20" THEN C=2
ELSE C=1
1420 R=R+1
1430 NEXT C
1435 RE$(K)="YES"
1440 NEXT K
1500 'PLAY GOLDEN MEDLEY
1505 NT=0
1510 FOR C=1 TO 2
1520 FOR K=1 TO 5
1530 IF RE$(K)="YES" THEN GOSUB
```

```
8000 ELSE GOTO 1560
1540 PRINT@38,"<A>NSWER OR <P>AS
S?"
1545 I$=INKEY$
1550 IF I$<>"A" AND I$<>"P" THEN
 GOTO 1545
1555 IF I$="A" THEN RE$(K)="NO":
GOSUB 9000
1560 NEXT K
1565 A$=""
1570 FOR K=1 TO 5
1580 IF RE$(K)="YES" THEN A$="AG
AIN"
1590 NEXT K
1600 IF A$="AGAIN" THEN C=1 ELSE
 C=2
1610 NEXT C
2000 'YOU WIN
2010 CLS
2015 PRINT@72,"CONGRATULATIONS"
2020 PRINT@(111-(LEN(PL$)/2)),PL
$;"!"
2025 PRINT@194,"IF THIS WERE THE
 REAL THING,   YOU WOULD HAVE JU
ST WON THE    OPPORTUNITY TO GO
ON TO PLAY FOR $100,000.  UNFORT
UNATELY, THIS   IS NOT THE REAL
THING."
2030 GOTO 10600
3000 'DRAW SOME NOTES
3010 W=RND(8)
3020 CLS(W)
3030 F$=CHR$(128)
3040 B$=CHR$(131+16*(W-1))
3050 E$=CHR$(138+16*(W-1))
3060 D$=CHR$(143+16*(W-1))
3070 PRINT@171,E$+B$;
3080 FOR W=1 TO 10:PRINT D$;:NEX
T W
3085 PRINT E$+B$;
3087 FOR W=1 TO 14:PRINT D$;:NEX
T W
3090 PRINTE$+B$+D$+D$+E$;
3095 FOR W=1 TO 7:PRINT D$;:NEXT
 W
3100 PRINTE$+B$+D$+D$+E$;
3105 FOR W=1 TO 15:PRINT D$;:NEX
T W
3110 PRINTE$+D$+D$+F$+F$+D$+D$+D
$+E$+B$+D$+D$+E$+D$+D$+F$+F$;
3120 PRINT@262,F$+F$;
3125 FOR W=1 TO 7:PRINT D$;:NEXT
 W
3130 PRINTE$+D$+D$+F$+F$;
3135 FOR W=1 TO 12:PRINT D$;:NEX
T W
3140 PRINT@302,F$+F$;
3145 FOR W=1 TO 16:PRINT D$;:NEX
T W
3150 FOR W=1024 TO 1056
3160 POKE W,42
3170 NEXT W
3180 FOR W=1 TO 14
3190 POKE(1055+W*32),42
3200 POKE(1056+W*32),42
3210 NEXT W
3220 FOR W=1503 TO 1535
3230 POKE W,42
3240 NEXT W
3250 RETURN
4000 'PICK TUNE SUBROUTINE
4010 FOR L=1 TO 2
4020 TRY$="OK"
4030 Y=RND(8)
4035 IF C$<>"YES" THEN X=RND(6)
4040 TUNE$=SO$(X,Y)
4050 FOR J=1 TO ST
4060 IF TUNE$=ST$(J) THEN TRY$="
NO"
4070 NEXT J
4080 IF TRY$="NO" THEN L=1 ELSE
L=2
4090 NEXT L
4100 ST=ST+1
4110 ST$(ST)=TUNE$
4120 RETURN
```

AT LAST! ! !

ARE YOU TIRED OF PLUGGING
AND UNPLUGGING PERIPHERALS?

WOULD YOU RATHER NOT SPEND
$50.00 ON A SWITCHING BOX?

PLAN-NET FORMS now offers complete plans (assembly instructions, diagrams, and parts lists by vendor) for RS-232 port switching boxes.

All parts are available almost everywhere locally at a small fraction of the cost of most commercially offered boxes.

Only $5.00 PER SET!!!

Plan-Net Forms
P.O. Box 1061
Wilkes-Barre, PA 18702-1061

NEW

OWL-WARE
WINCHESTER BASIC

ANNOUNCING... the Development of a Major Breakthrough in HARD DRIVE SYSTEMS for the COLOR COMPUTER!!!

Several months ago OWL-WARE introduced the Finest OS9 Hard Drive System for the Color Computer. Now we are about to introduce the only RSDOS Interface System worthy of our computer, OWL-WARE Winchester Basic. For the first time you have available a true Winchester System, although there are 10 directories made available to BASIC, the only limit to size of any file is the size of your drive. On a 10 meg drive you could have a 8 meg file on directory 5 and a 1 meg file on directory 8 and small files everywhere. You turn the computer on and you can immediately access your drive from BASIC or any language using commands you already know. You do not have to know or use OS9 to use OWL-WARE WINCHESTER BASIC, but if you do, all files saved from RSDOS are available to OS9. All files generated from OS9 can be made available to RSDOS by copying to the WINCHESTER BASIC directories. There are no partitions to wall you into, only one operating system, but nothing forces you to use an operating system you don't like.

Call for further details and availability on this breakthrough product!!!

Prices WITH DRIVE BELOW ONLY... **$50.** WITHOUT DRIVE **$75.**

MISAR QUICK FILE...

the Fastest, Easiest to Learn Data Base System Available for the Color Computer!!!

only... $44.95

"WE BELIEVE THAT THIS PROGRAM IS SO GOOD AND EASY TO USE THAT WE DARE TO GIVE A...

15 DAY MONEY BACK GUARANTEE"

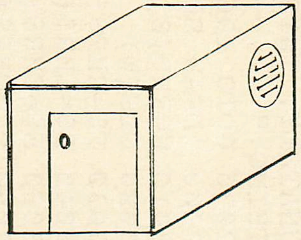
OS-9 HARD DRIVE SYSTEMS

Disk Access is at Least... *8 Times Faster than Floppy Drives.*

Control up to 2 Drives. EACH with Continuous Massive Memory!!! Complete OS-9 Hard Drive System Includes... Software, Hard Drive, Controller and L.R. Tech Interface.

$525. 5MEG **$659.** 10MEG
$799. 20MEG

OWL-WARE is pleased to announce an exclusive arrangement to Distribute the L.R. TECH Hard Drive Interface and Software.



Interface & Software Only $99.

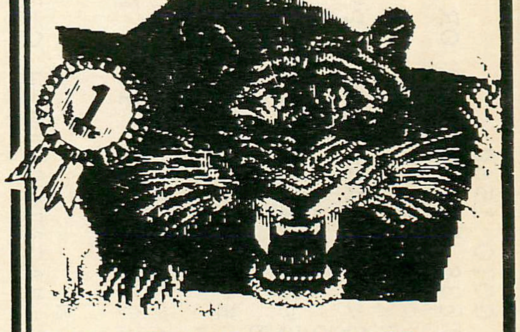
NOTE: Interface is not Interrupt Driven Like Our Competition. Therefore, the System Clock does not Lose Time During Hard Drive Access.

INSTALL IN ANY SLOT OF MULTI-PAK OR USE Y CABLE.

DEALERS INQUIRES INVITED

"TIGRESS"... The Winner *of Compuserve's COCO SIG Graphics Programming Contest.*

DRAWN USING MASTER ARTIST
BY THE AUTHOR OF THE PROGRAM

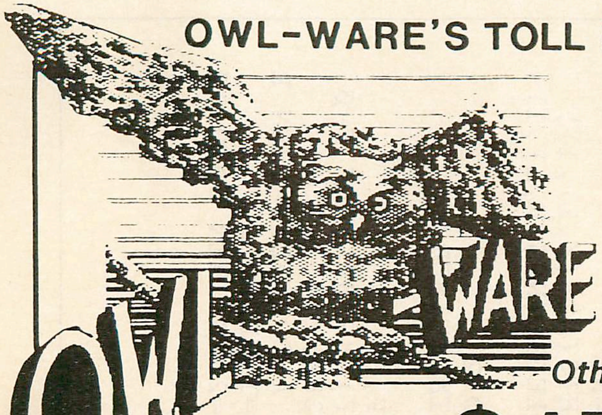


GET IT **ALL** IN ONE PROGRAM:
- TOUCH PAD INPUT
- X-PAD INPUT
- MOUSE INPUT
- JOYSTICK INPUT
- PAINT COMMAND
- TEXTURES
- "RUBBER STAMP" PAINTBRUSHES
- LETTERING IN ANY SIZE
- COLOR SCREEN DUMP TO INK-JET

FREE-HAND DRAWING'
MAGNIFY''

MASTER ARTIST (V.2.0) ....
64K disk.................. 29.95

OWL-WARE'S TOLL FREE ORDER LINE (800) 245-6228



DISK DRIVES

TECHNICAL ADVICE
(215) 682-6855

All Prices Include
Case and Power
Supply

Other Drive O Systems from $179. Double Sided

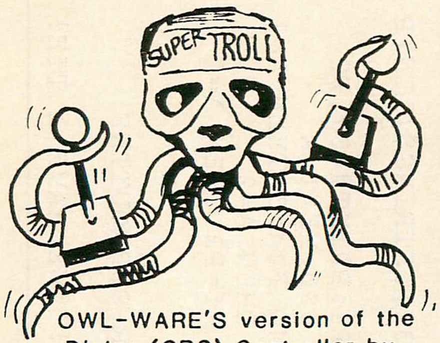
DRIVE 0 $179. to $239. Single Double Quad

...Call for SPECIAL PRICES on Drive 0,1,2,3 Combos.

DRIVE 1 $99. to $145.

NOW AVAILABLE !!!

SUPER-TROLL



OWL-WARE'S version of the Distro (CRC) Controller by Tony DiStefano. This has sockets for 4 ROM Chips. ...only $5.00 additional with a Drive 0 System.

ADD ON OPTIONS:

CDOS	$6.
Parallel Printer Port	$25.
Real Time Clock	$10.
80 Column Card	$49.

Just Controller $99. with CDOS to $195. with ALL options

All drives are new and fully assembled. We ship *FULLY TESTED and CERTIFIED DRIVES at NO ADDED CHARGE!*

EPSON and Other Brands known as the highest quality made.

STATE-OF-THE-ART
TECHNOLOGY

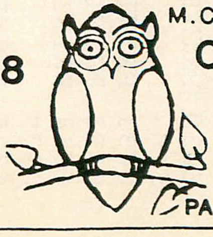
See Special Bundled Software with Disk Drive Purchase!

We have RSDOS, JDOS, OWL DOS, ADOS available on ROM. Call about Double Sided or Special Needs.

1 YR. WARRANTY ON ALL ITEMS!!!

TOLL FREE ORDER LINE (800) 245-6228

Call for
LATEST
PRICES!!!



M.C. & VISA Accepted

OWL-WARE
P.O. Box 116-D
Mertztown, PA.
19539

PA Res Include 6% Tax
PA (215) 682-6855

OWL TIP:

We stock Single Sided Drives, but at the Current Prices why not BUY Double Sided???

OWL-WARE SOFTWARE BUNDLE: DISK TUTORIAL
2 UTILITIES
2 GAMES

DISK TUTOR

LEARN EVERYTHING ABOUT DISK BASIC FROM THIS MACHINE LANGUAGE PROGRAM. THE TUTOR TAKES YOU STEP BY STEP THROUGH THE LESSONS AND CORRECTS YOUR MISTAKES A MULTI-LESSON TUTORIAL THAT WILL GIVE YOU QUICK, PAINLESS KNOWLEDGE OF DISK BASIC (THIS PROFESSIONALLY WRITTEN TUTOR IS EASILY WORTH THE BUNDLE'S TOTAL PRICE).

OWL DOS

AN OPERATING SYSTEM THAT GIVES 25% FASTER DISK ACCESS AND ALLOWS USE OF DOUBLE SIDED DRIVES. CORRECTS FLOATING POINT NUMBER ERROR.

COPY-IT

QUICKLY COPIES SELECTED PROGRAMS FROM DISK. USE WILD CARD OPTION SEARCH TO SELECT GROUPS OF PROGRAMS FOR COPY (NOT FOR PROTECTED PROGRAMS)

2 GAMES

2 GAMES FROM OUR STOCK.
BOTH HAVE SOLD FOR OVER $17. EACH.

IF SOLD SEPARATELY OVER $125.00 WORTH OF SOFTWARE!!!

only $24.95!!!
(or even better)
$4.95 with
DISK DRIVE PURCHASE!!!

```
4999 'PLAY TUNE SUBROUTINE
5000 F=0
5001 FOR C=1 TO 2
5010 F=F+1
5020 GET#1,R
5030 INPUT#1,NO$(F)
5040 IF NO$(F)="P20" THEN C=2 EL
SE C=1
5050 R=R+1
5060 NEXT C
5065 TIMER=0:C=0
5070 FOR H= 1 TO F
5080 PLAY NO$(H)
5100 P=PEEK(65280)
5110 IF P=254 THEN PL$=P1$:H=F
5120 IF P=253 THEN PL$=P2$:H=F
5125 IF TIMER>=2000 THEN H=F:C=1
5130 NEXT H
5135 IF P<>254 AND P<>253 AND C<
>1 THEN GOTO 5070
5140 RETURN
6000 'ANSWERING SUBROUTINE
6005 CLS
6010 PRINT@12,PL$;"!!"
6015 PRINT@65,"PRESS SPACEBAR TO
 CHECK ANSWER"
6020 IF INKEY$=CHR$(32) THEN GOT
O 6030 ELSE GOTO 6020
6030 PRINT@129,"THE SONG TITLE I
S:"
6031 PRINT@197,TUNE$
6033 PRINT@256,STRING$(32,45)
6034 PRINT@295,"<R>IGHT OR <W>RO
NG?"
6035 ANSWER$=INKEY$
6036 IF ANSWER$<>CHR$(82) AND AN
SWER$<>CHR$(87) THEN GOTO 6035
6038 IF ANSWER$="R" THEN X$="RIG
HT"
6040 IF PL$=P1$ AND X$="RIGHT" T
HEN P1=P1+1 ELSE IF PL$=P2$ AND
X$="RIGHT" THEN P2=P2+1
6045 S1=(359-(LEN(P1$)/2))
6050 S2=(375-(LEN(P2$)/2))
6055 PRINT@ S1,P1$:PRINT@ S2,P2$
6060 PRINT@(S1+32),STRING$(LEN(P
1$),45)
6065 PRINT@(S2+32),STRING$(LEN(P
2$),45)
6070 PRINT@421,P1:PRINT@437,P2
6075 FOR W=1 TO 500:NEXT W
6080 IF P1<>3 AND P2<>3 THEN A=1
6090 IF TUNE>=5 THEN A=2
6095 IF A=2 AND P1=P2 THEN A=1
6100 X$="WRONG"
6110 RETURN
7000 'TIEBREAKER SUBROUTINE
7001 CLS
7002 PRINT@38,"!!!WE HAVE A TIE!
!!"
7003 PRINT@101,"YOU BOTH HAVE 20
 POINTS, SOWE WILL PLAY A TIEBRE
AKING SONG TO SEE WHO GOES ON TO
 THE GOLDENMEDLEY. PRESS YOUR FI
RE BUTTON  WHEN YOU KNOW THE SON
G. A WRONG ANSWER WILL LEAD TO A
NOTHER     SONG. ";
7004 PRINT"THE FIRST CORRECT ANS
WER  WILL END THE TIEBREAKER."
7005 PRINT@419,"PRESS SPACEBAR T
O CONTINUE"
7006 I$=INKEY$: IF I$<>CHR$(32)
THEN GOTO 7006
7007 GOSUB 3000
7008 FOR Z=1 TO 2
7010 C$="YES"
7020 GOSUB 4000
7030 R=((X-1)*8+Y)*200
7040 GOSUB 5000
7050 CLS
7053 PRINT@45,PL$;"!!"
7055 PRINT@97,"PRESS SPACEBAR TO
 CHECK ANSWER"
7056 W$=INKEY$:IF W$<>CHR$(32) T
HEN GOTO 7056
7057 PRINT@161,"THE SONG TITLE I
S:"
7058 PRINT@196,TUNE$
7059 PRINT@295,"<R>IGHT OR <W>RO
NG"
7060 ANSWER$=INKEY$
7061 IF ANSWER$<>CHR$(82) AND AN
SWER$<>CHR$(87) THEN GOTO 7059
7062 IF ANSWER$="R" THEN X$="RIG
HT"
7090 IF X$="RIGHT" THEN Z=2 ELSE
 Z=1
7100 NEXT Z
7110 RETURN
8000 'PLAY TUNE(GOLDEN MEDLEY)
8005 GOSUB 3000
8010 F=0:TIMER=NT
8011 T=VAL(RIGHT$(N2$(K,1),1))
8012 N2$(K,1)=LEFT$(N2$(K,1),1)+
STR$(T+1)
8020 FOR R=1 TO 2
8025 PRINT@27,INT(TIMER/66)
8030 F=F+1
8040 PLAY N2$(K,F)
8050 IF N2$(K,F)="P20" THEN F=0
8060 P=PEEK(65280)
8070 IF P<>126 AND P<>254 THEN R
=1 ELSE R=2:NT=TIMER
8080 IF TIMER>=2000 THEN GOTO 10
500
8090 NEXT R
8100 CLS
8110 RETURN
```

```
9000 'ANSWER SUBROUTINE(GOLDEN M
EDLEY)
9010 PRINT@65,"PRESS SPACEBAR TO
 CHECK ANSWER"
9020 IF INKEY$<>CHR$(32) THEN GO
TO 9020
9030 PRINT@129,"THE SONG TITLE I
S:"
9032 PRINT@197,GM$(K)
9034 PRINT@256,STRING$(32,45)
9036 PRINT@295,"<R>IGHT OR <W>RO
NG?"
9050 ANSWER$=INKEY$
9060 IF ANSWER$<>CHR$(82) AND AN
SWER$<>CHR$(87) THEN GOTO 9050
9070 IF ANSWER$=CHR$(87) THEN GO
TO 10500
9080 RETURN
10000 CLS
10005 PRINT@41,"MELODY ROULETTE"
10010 PRINT@73,STRING$(15,45)
10015 PRINT
10020 PRINT"THE WHEEL WILL SPIN
TO SEE HOW  MUCH MONEY YOU'RE PL
AYING FOR.  THEN YOU'LL LISTEN T
O A MAXIMUM OF 5 SONGS."
10025 PRINT"  IF YOU KNOW A SONG
, PRESS YOURJOYSTICK BUTTON. THE
 PLAYER WITHTHE MOST POINTS OUT
OF 5 SONGS  WINS THIS PART.  MEL
ODY ROULETTE IS WORTH 10 GAME PO
INTS."
10030 PRINT@451,"PRESS SPACEBAR
TO CONTINUE"
10035 I$=INKEY$
10040 IF I$<>CHR$(32) THEN GOTO
10035
10045 RETURN
10100 CLS
10105 PRINT@43,"TUNE TOPICS"
10110 PRINT@75,STRING$(11,45)
10115 PRINT
10120 PRINT"A RANDOM CATEGORY WI
LL BE CHOSENAFTER WHICH A MAXIMU
M OF 5 SONGSWILL BE PLAYED FROM
THE CHOSEN  CATEGORY. ONCE AGAIN
, PRESS YOURJOYSTICK BUTTON IF Y
OU KNOW THE SONG. TUNE TOPICS IS
 WORTH 10   GAME POINTS."
10125 PRINT@451,"PRESS SPACEBAR
TO CONTINUE"
10130 I$=INKEY$
10135 IF I$<>CHR$(32) THEN GOTO
10130
10140 RETURN
10200 CLS
10205 PRINT@43,"BID-A-NOTE"
10210 PRINT@75,STRING$(10,45)
10215 PRINT
10220 PRINT"A CLUE WILL BE GIVEN
, FOLLOWED  BY BIDDING. THE FIRS
T BIDDER CAN NOT PASS, ALTHOUGH
BIDDING CAN START AS HIGH AS 15.
 ONCE AGAIN, A MAXIMUM OF 5 SONG
S WILL BE   PLAYED.  BID-A-NOTE
IS WORTH 20 GAME POINTS.";
10225 PRINT" THIS IS THE LAST
PART BEFORE THE WINNER GOES ON,
ALONE, TO PLAY THE GOLDEN MEDLEY
"
10230 PRINT@451,"PRESS SPACEBAR
TO CONTINUE"
10235 I$=INKEY$
10240 IF I$<>CHR$(32) THEN GOTO
10235
10245 RETURN
10300 CLS
10305 PRINT@41,"GOLDEN MEDLEY"
10310 PRINT@73,STRING$(13,45)
10315 PRINT
10320 PRINT"YOU'RE ON YOUR OWN N
OW AND YOU  HAVE 30 SECONDS TO N
AME 5 TUNES. PRESS THE LEFT JOYS
TICK BUTTON TO STOP THE SONG. YO
U CAN EITHERNAME THE SONG OR PAS
S ON IT TILLYOU'VE NAMED THE RES
T.";
10325 PRINT" THE TIMER ONLY RUNS
 WHEN THE MUSIC IS     PLAYING. T
HE GAME IS OVER AS     SOON AS YO
U ANSWER INCORRECTLY."
10330 PRINT@451,"PRESS SPACEBAR
TO CONTINUE"
10335 I$=INKEY$
10340 IF I$<>CHR$(32) THEN GOTO
10335
10345 RETURN
10500 CLS
10510 PRINT@77,"SORRY"
10520 PRINT@(111-(LEN(PL$)/2)),P
L$;"!"
10530 PRINT@194,"IT WAS A GOOD G
AME AND YOU     PLAYED WELL,BUT Y
OU DIDN'T QUITE MAKE IT TO THE E
ND. NOT TO      FRET...THERE WAS
 NO PRIZE FOR      WINNING THIS G
AME ANYWAY!"
10600 FOR W=1 TO 5
10610 F=0
10620 FOR J=1 TO 2
10630 F=F+1
10640 PLAY N2$(W,F)
10650 IF N2$(W,F)="P20" THEN J=2
 ELSE J=1
10660 NEXT J
10670 NEXT W
10675 CLS
10680 END
```

EDUCATION NOTES

16K
ECB

Teaching Language Idioms

By Steve Blyn
Rainbow Contributing Editor

This month's program is a playful one designed mainly for those in the middle grades. It's good for all of us to occasionally take a break from more serious educational programs. This program points out idioms, one of the peculiarities of our language. We are going to have fun with some idioms that refer to bodily figures of speech. We have included such expressions as "crossed fingers," "toe the mark" and "nose to the grindstone."

If your students are motivated to discover the derivation of these idioms, then we have accomplished even more than we set out to do. We'll demonstrate how to add to the list to make it more comprehensive. Our main purpose, though, is enjoyment. We intend to show students that the computer can easily produce fun and educational programs.

While testing the program with middle school students, we found that a great source of amusement was the errors made — some deliberately. Even after the students learned the idioms, they had a lot of fun entering answers other than the correct ones. "With tongue in cheek" became "with toe in cheek." "Feet of clay" became "nose of clay" and so forth. This experiment inspired a jovial atmosphere — laughing girls and boys, chuckling teachers, animated discussion, thinking out loud — it was delightful.

Lines 40 and 50 set the dimensions at 15 questions and answers. 'N' was set at 15 simply because we ran out of body-part idioms. If you can think of others, add more `DATA` lines and adjust the number on Line 40 accordingly. Lines 60-80 read these questions and answers from the `DATA` lines.

Line 100 chooses a random question and answer (variable 'R'). The program gives six answers from which to choose. The variable 'J' in Line 110 subtracts a number between one and five from the correct answer. The six answers printed start at the true number (R) less 'J' and include five more choices. The true answer is ensured a place among the six listed. Lines 170-190 print out the choices.

The only problem is the 'J' variable may fall below number one, or the 'J'-plus-five amount may exceed the 15 listed answers. If these situations occur, we encounter several BS errors. This indicates there is no such string. To prevent these problems, we set further restrictions on the 'J' values in lines 120 and 130.

Line 200 asks the question and Line 210 waits for the answer. Lines 220 and 230 evaluate whether the answer is correct. Line 240 prints the correct answer if the student gives an incorrect response. Lines 250-270 wait for the user to press the ENTER key to continue. If 'E' is pressed, the program ends.

We assumed that players would soon master this program completely since there are only 15 questions. Therefore, we did not include a scorecard. If it is needed, you could display the score at the bottom of the screen at all times. We included an extra variable (CR) on Line 220 to count the correct answers.

We hope your child or student enjoys learning these idioms. Perhaps you or they will be creative and produce a similar program with other idioms. Colors would be a good possibility, using questions such as "-- as a beet" or "-- with envy" or "feeling sad and --." We here at Computer Island always enjoy hearing from readers about their experiences with the programs in this column. ☐

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

The listing: `IDIOMS`

```
10 REM"UNUSUAL USE OF OUR LANGUA
GE"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,NY,1986
30 Z$=STRING$(32,255)
40 N=15
```

```
50 DIM A$(N),B$(N)
60 FOR T= 1TO N
70 READ A$(T),B$(T)
80 NEXT T
90 CLS:PRINT"     OUR STRANGE LA
NGUAGE"
100 R=RND(N)
110 J=R-RND(5)
120 IF J<1 THEN J=1
130 IF J>10 THEN J=10
140 PRINT@32,Z$
150 PRINT@288,Z$;
160 PRINT@320,"";
170 FOR T=J TO J+5
180 PRINTB$(T),
190 NEXT T
200 PRINT@64,A$(R):PRINT:PRINT"N
AME THE BODY PART - ";
210 LINEINPUT G$
220 IF G$=B$(R) THEN PLAY"O3L100
CCDECDEFFGGGG":CR=CR+1:GOTO 250
230 IF G$<>B$(R) THEN PLAY"O1L10
0FFF"
240 PRINT:PRINT"     THE ANSWER I
S "B$(R)
250 PRINT:PRINT"     PRESS ENTER
TO GO ON";
260 EN$=INKEY$
270 IF EN$=CHR$(13) THEN 90 ELSE
 IF EN$="E" THEN END
280 GOTO 260
290 DATA ------ OF CONTENTION.,B
ONE
300 DATA SPLITTING ------.,HAIRS
310 DATA ------ TO THE WHEEL.,SH
OULDER
320 DATA WITH ------ IN CHEEK.,T
ONGUE
330 DATA TURN THE OTHER ------.,
CHEEK
340 DATA WITH ------ CROSSED.,FI
NGERS
350 DATA ------ THE MARK.,TOE
360 DATA ARMED TO THE ------.,TE
ETH
370 DATA ------ GREASE.,ELBOW
380 DATA ------ IN GLOVE.,HAND
390 DATA STAB IN THE ------.,BAC
K
400 DATA ------ TO THE GRINDSTON
E.,NOSE
410 DATA DON'T STICK YOUR ------
 OUT.,NECK
420 DATA IN ONE ----- AND OUT TH
E OTHER.,EAR
430 DATA ------ OF CLAY.,FEET
```

★★★★★★ **SELECTED SOFTWARE** ★★★★★★

SOLDERLESS UPGRADE KITS

With easy-to-follow instructions

64K FOR E BOARD	$39.95
64K FOR F BOARD	$29.95
64K FOR COCO2* (ALL MODELS)	$29.95

*All Korean models require one solder joint.

NOTE: All ICs used in our kits are first quality 150 NS prime chips and carry one full year warranty

BASIC ROMs DISASSEMBLY

COLOR BASIC UNRAVELLED	$17.95
EXTENDED BASIC UNRAVELLED	$17.95
DISK BASIC UNRAVELLED	$17.95
ALL 3 BOOKS	ONLY $39.95
ULTRA 80C DISK EDITOR ASSEMBLER	$29.95
BUG OUT & THE ORACLE (M.L. Monitor)	$14.95
ALL 5 ITEMS	ONLY $59.95
500 POKES, PEEKS, 'N EXECS	$16.95
UTILITY ROUTINE (VOLUME 1)	$19.95
WITH ROUTINES ON TAPE OR DISK	$36.95
ASSEMBLY LANGUAGE PROGRAMMING (NEW)	$16.95
ALL 9 ITEMS	ONLY $119.95

COCO MAX tape only	$64.95
COCO MAX II disk only	$74.95
Y-BRANCHING CABLE	$27.95
DS-69A DIGISECTOR & C-SEE III SOFTWARE	$149.95
HJL-57 KEYBOARD	$69.95
VOLKS MODEM	$54.95
THE INTRONICS EPROM Programmer	
Program Up to 64K Eprom	$139.95
DATARASE (Eprom Eraser)	$39.95
2764 HIGH SPEED COMPATIBLE	$5.95
27128 HIGH SPEED COMPATIBLE	$7.95
ROM PACK P.C. BOARD	
with case for 27xx	$9.95
TEAC 55B DS/DD Half Height Drive	$109.95
CASE AND POWER SUPPLY	$49.00
NEW J & M DISK CONTROLLER	
with J Dos 1.2	$129.00
DISKETTE CAROUSEL	$24.95
ZENITH ZVM-123 GREEN	$99.00
ZENITH ZVM-122 AMBER	$109.00
VIDEO PLUS	$24.95
VIDEO PLUS IIC	$34.95
VIDEO PLUS IIU	$34.95
REAL TALKER I	
With 3 talking games	$49.95
REAL TALKER II	
With 3 talking games	$54.95
NUMBER JACK THE HJL Numeric Key Pad	$79.95

WIZARD'S CASTLE
64K Graphic Adventure
By Spectral Associates
Disk only $19.95

Top 5 Spectral Associates
games in one package
Galagon, Lancer, Cubix,
Froggie & Lunar Rover Patrol
for only $34.95 tape or disk

Take a closer look. . .

	TAPE	DISK
DYNACALC		$74.95
PROCOLOR FILE 20		$49.95
MASTER DESIGN		$29.95
TELEWRITER 64	$39.95	$47.95
SUPER SCREEN MACHINE	$35.95	$38.95
RAINBOW SCREEN MACHINE	$23.95	$26.95
PEN PAL		$64.95
AUTOTERM	$31.95	$39.95
ADOS		$27.95
SUPER BACKUP UTILITY		$44.95
THE PEEPER WITH SOURCE	$24.95	$26.95
GRAPHICOM		$17.95
32K GAMES		
P51 MUSTANG	$23.95	$27.95
Optional Cable	$9.95	
SAILOR MAN (64K)	$23.95	$27.95
WORLDS OF FLIGHT	$23.95	$26.35
DRAGON SLAYER		$23.95
DRACONIAN	$19.95	$22.95
SR-71	$23.15	$24.75
BUZZARD BAIT	$19.95	$22.95
GALAGON	$16.95	$18.95
LUNAR ROVER PATROL	$16.95	$18.95
MS GOBBLER	$16.95	$18.95
LANCER	$16.95	$18.95
CUBIX	$16.95	$18.95
FROGGIE	$16.95	$18.95
SPACE PAC (10 M.L. GAMES)	$21.95	$21.95
EDUCATIONAL PAC (6 PROGRAMS)	$19.95	$19.95
ADVENTURE PAC (5 GAMES)	$19.95	$19.95
TREASURY PAC (30 GAMES)	$29.95	$29.95

WE PAY SHIPPING in the United States, Canada & Mexico. Overseas please add 10%. (MN Residents add 6% sales tax.) We accept Visa, Mastercard, check or money order. U.S. funds only for foreign orders. C.O.D. please add $2.00. (USA only).

Send to: **SELECTED SOFTWARE**
P.O. Box 32228, Fridley, MN 55432
24 HOUR ORDER LINE 612-757-2439
INFORMATION 612-757-1026 (11 A.M. - 2 P.M. C.S.T.)
SAME DAY SHIPPING BEFORE 1 P.M. C.S.T.

Robots: Their Place in Education

By Michael Plog, Ph.D.
Rainbow Contributing Editor

A young woman was spending a rainy summer vacation with a group of artistic people, including some major literary "names." The group, restricted to indoor activities, told eerie stories for amusement. One of the venerable members of the group suggested that everyone write a ghost story. The young woman, named Mary Godwin, wrote a horror story based on a dream she had a few nights after the suggestion. She later married one of the members of that group, Percy Bysshe Shelley. Whether or not you have heard of Percy or Mary, you certainly know Mary's horror story, *Frankenstein* (or, the *Modern Prometheus*).

Mary Shelley's book became a prototype for horror stories, particularly those concerning robots. Mary had never heard the term "robot." Her book was written in 1818 and the word robot came into being in a 1920 play by Karel Capek titled *R.U.R.* The word robot comes from the Czech word "robotnik," for worker or serf. Capek wrote about people creating mechanical beings to do work for humans.

Science fiction writer Isaac Asimov has been called "the father of robotics" because of the many stories he has written about the mechanical creatures. And for another important reason — Asimov's robots are not creatures who turn on their creators (like Frankenstein), but are manufactured by engineers to fit exacting specifications. The most important of these specifications is that robots may not harm human beings. Their circuits simply do not allow such an action. Thus, modern robot stories eliminate the fear (the Frankenstein complex) people have about mechanical intelligence.

Modern robots are industrial automations that perform a series of steps to complete a task. Robots are not yet made in the general shape of humans and have extremely limited intelligence. My daily life seldom brings me in touch with industrial robots, but I have a few contacts with other types. For example, I interact with a robot when making long distance telephone calls. I simply dial an 800 number, enter my access number, then dial the number I want to reach. This all takes place with the aid of robots.

Besides industrial robots, there are robot "toys" for the home. Some of these machines are built in a similar fashion to the *Star Wars* robots and can perform a variety of tasks. The home robots, as well as industrial robots, need to be programmed. Indeed, a robot has a computer "brain" to allow human programming.

Since robots use computers, and may be considered as a subcomponent of the field of computer science, it is only natural that robots function in schools as well as factories and homes. Generally, they are used in computer classes and electronics courses. Students learn about robots by building the mechanical workers and programming them to perform a task.

When computers first appeared in schools, educational leaders wondered and debated about their use. In the beginning, they were used in classrooms to teach *about* computers. More recently, myriad uses have been made of computers in schools. Students use

---

Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district and currently is employed at the Illinois State Board of Education.

them for a multitude of purposes other than learning BASIC programming. In fact, students can be declared computer literate without ever knowing about binary addition and subtraction. Computers are being used more and more as learning tools in classrooms. Students use word processing packages to write reports, database programs are used to examine information from science experiments, and the list goes on.

The educational community has spent over a decade debating the computer's role in elementary and secondary education. The debate continues even today, although most educational professionals consider the computer to be an additional (and very important) tool for students in the classroom, with a wide variety of purposes. There is no reason to expect the debate over the educational role of robots to be any less active than the debate over computer uses. What are appropriate activities for robots in the school? Should students simply learn about them, then consider the utility of robotics finished? Should robots be used as another tool for students, in the same way computers are an educational tool?

Despite similarities, robots and computers are not the same thing. Computers tend to be more oriented toward mental activities. Robots, on the other hand, tend to interact with the physical environment in a much more direct way than computers. For example, consider students working with a word processing package. The actual printing of a page is a physical activity, but is much less important than the mental activity of the student creating the document.

When you sit down in front of the Color Computer to write a program, most of the activity is the relationship between your mind and the screen. Not so with a robot. The observable activity of a robot performing a task deals with physical objects. Screws are tightened, materials are moved from one place to another, objects are assembled, and so on. The programming of a robot may involve the same mental activity as the programming of the Color Computer, but the end result differs.

Another feature of modern robots is their level of intelligence is not (and may never be) that which exists in fiction. A robot teacher may exist in science fiction stories, but will not be a reality in a classroom during my lifetime. A robot message carrier, however, is a tangible reality.

With current technology, we can reasonably expect robots to perform any task a well-trained pet can perform. Before the end of this century, we may see a robot collecting lunch counts from teachers and delivering this information to the school cafeteria. It is not unreasonable to expect a robot to sweep the gym floor between classes, or to inform the administration when a child wanders away from the playground. But, I seriously doubt a robot will decide the grade a student should receive in math class, or referee an intramural basketball game.

The future of educational robots will probably be more interesting than the present fiction. The current reality of computers in education is much more than past science fiction writers ever dreamed. I would enjoy hearing about the uses of robots in your school. If there is such a creature (even if it deserves the nickname "Frankenstein") in your school, please let me know of your experiences. My address is 829 Evergreen, Chatham, IL 62629.

Two-Liner Contest Winner . . .

Here's a great little ski game. Use your right joystick to maneuver the player through as many of the 20 gates as possible. This would also be a good candidate for the speed-up POKE once you become experienced.

The listing:

```
1 CLS:PRINT"ski-run":FORI=1TO999
:NEXT:P=6:PRINT"READY":FORI=1TO9
99:NEXT:CLS:FORI=1TO21:G9=G:G=RN
D(10)+2:FORJ=1TO16:FORZ=1TO50:NE
XT:PRINT" *"TAB(14)"*":POKE1024+
P,72:IFJOYSTK(0)<9THENP=P-1:IFP=
2THENP=3ELSEELSEIFJOYSTK(0)>54TH
ENP=P+1:IFP=13THENP=12
2 NEXT:IFI=21THENIFG9=P THENSC=S
C+5:SOUND99,1:PRINT" "STRING$(14
,"-")TAB(20)"finish","SCORE->"SC
:ELSEPRINT" "STRING$(14,"-")TAB(
20)"finish","SCORE->"SC ELSEPRIN
T" *"TAB(G-1)"! !"TAB(14)"*"TAB(
20)"GATE"I:IFG9=P THENSC=SC+5:SO
UND99,1:NEXTELSENEXT
```

Jason Steele
Pensacola, Florida

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

J&R ELECTRONICS

Complete 256K and 512K Memory Expansion Systems
(Hardware, Software and documentation included)
User friendly software, programmer not required

Easy, Solderless Installation

★ We have eliminated the necessity to piggyback for 512K versions! ★

RAMDISK — Fast disk I/O, 35/40 track (two RAM drives with 512K)

PCOPYMOR — More than 30 PMODE 4 screens in memory at once! PCOPY command modified to accept PCOPY 1 to 128. More than 70 PMODE 4 screens and PCOPY 1 to 302 with 512K versions (or 30 PMODE 4 screens with one RAMDISK).

SPOOLER — HUGE printer buffer for offline storage inside your computer while the printer's busy. Customizable from 30K to over 200K (500K with 512K versions). Buffer can be turned off/on copied using simple PRINT CHR$ commands.

PAGER — Load multiple BASIC programs into memory at once! 8 (16 with 512K versions) pages of 32K with a PAGE command added to BASIC. Page PEEKs and POKEs access data in other Pages. 4 (8 with 512K versions) pages of 64K in 64K modes. Fully commented source code provided for this one!

Plus — Various utilities and demo's. Detailed documentation, programs, system memory usage, and a lot more included.

OS9 Ramdisk — Fast OS-9 disk I/O! 35/40 track single sided or 40 track double sided (512K) Ramdisk under OS9! GOOD's OS9 Ramdisk (Rainbow Feb '86) with fully commented source code and install files added by J&R. (Requires OS9 operating system)

ALL software above is configurable for 256K/512K operation.
Software shipped on disk, add $10.00 for software on tape.
(OS9 RAMDISK not available on tape).
ALL boards below are 256K/512K capable, software & documentation included.
New SAM (74LS785) not included (use your 74LS783), 74LS785 recommended for 2.0 MHz operation.

Part number	Price	Description
#1001	$39.95	Banker II bare board (with long pin socket, does not include memory Expansion Board)
#1002	$69.95	Banker II bare board + parts (does not include Memory Expansion Board)
#1004	$129.95	Banker II (256K, upgradable to 512K) assembled & tested with memory
#1005	$169.95	Banker II (512K) assembled & tested with memory
#1006	$15.00	Memory Expansion Board
#1007	$29.95	Memory Expansion Board + parts
#9000	$89.95	Down Under Controller. Ram Pack size controller with BDOS Gold plated, high reliability edge connectors, jumpers for 24/28 pin ROM. Compatible with COCO I and COCO II.
#9001	$35.00	BDOS (Enhanced DOS on 27128 EPROM)
#9002	$5.00	64K switch
#9003	$19.95	Banker II software pack
#9004	$24.95	New SAM 74LS785 (required only for 2.0 MHz operation)

To place an order, write to J&R Electronics, P.O. Box 2572, Columbia, MD 21045, OR call (301) 987-9067 or (301) 788-0861.

HOURS: Weekdays 7 p.m.-9 p.m.; Sat. Noon-5 p.m. EASTERN TIME.

Add $4.00 shipping & handling (FOREIGN ORDERS $7.00), COD charge $3.00. Maryland residents add 5% state tax.

CHECKS, MONEY ORDERS OR COD's only please (personal check — 2 weeks for clearance). IMMEDIATE DELIVERY. Give COCO Radio Shack model # (i.e. 26-3136), Disk or Tape when ordering.

QUANTITY DISCOUNT AVAILABLE. For information on shipping or previously placed orders call (301) 788-0861. COCO II 26-31XX owners call (soldering experience may be required).

Computer Island Educational Software

227 Hampton Green, Staten Island, New York 10312
(718) 948-2748

PRESCHOOL

PROGRAM TITLE	GRADES	MEMORY	PRICE
Preschool I - counting	Pre-K	16K Ext.	11.95
Preschool II - adding	Pre-K	16K Ext.	11.95
Preschool III - alphabet	Pre-K	16K Ext.	11.95
Music Marvel-play songs	Pre-K,1	16K-Ext.	11.95
Arrow Games - 6 games	Pre-K,1	32K-Ext.	21.95
First Games - 6 games	Pre-K,1	32K-Ext.	24.95
Mr. Cocohead-facemaker	K-3	16K-Ext.	16.95
Bentley Bear	Pre-K	32K-Disk	29.95

LANGUAGE ARTS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Beyond Words 1-3 parts	3-5	32K-Ext.	19.95
Beyond Words 2-3 parts	6-8	32K-Ext.	19.95
Beyond Words 3-3 parts	9-12	32K-Ext.	19.95
Vocabulary 1-1000 words	3-5	32K-Ext.	19.95
Vocabulary 2-1000 words	6-8	32K-Ext.	19.95
Vocabulary 3-1000 words	9-12	32K-Ext.	19.95
Context Clues	4,5,6,or 7	16K-Ext.	17.95
Cocojot - jotto game	3-up	16K	11.95
Reading Aids - 4 parts	2-4	16K-Ext.	19.95
King Author - writing tool	2-6	16/32 Ext.	29.95
Cocowheel of Fortune	4-up	32K-Ext.	19.95
Context Clues	2-3	32K-Ext.	19.95

FOREIGN LANGUAGES

PROGRAM TITLE	GRADES	MEMORY	PRICE
French Baseball-200wds.	4-up	16K-Ext.	11.95
French Baseball-500wds.	4-up	32K-Ext.	19.95
Spanish Baseball-200wds	4-up	16K-Ext.	11.95
Spanish Baseball-500wds	4-up	32K-Ext.	19.95
Italian Baseball-200wds.	4-up	16K-Ext.	11.95
Hebrew Alphabet	beginners	16K-Ext.	11.95
Hebrew Utility	drawing utility	16K-Ext.	15.95

CRITICAL THINKING PROBLEMS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Memory Castle-Sunburst	4-up	32K-disk	44.95
Factory by Sunburst	4-up	32K-disk	44.95
Pond by Sunburst	2-up	32K-disk	44.95
Teasers by Tobbs-Sunb.	4-up	32K-disk	44.95
Inner City - simulation	7-up	32K-disk	49.95
Find The Math Sequence	4-up	32K-Ext.	19.95
Stranded-graphic advent.	4-up	32K-disk	24.95

TEACHER/STUDENT AIDS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Colorgrade - gradebook	Adult	32K-disk	29.95
Quizmaker - write quizzes	5-up	32K-Ext.	24.95
ETT typing tutor (CocoWarehouse)	4-up	16K-Ext.	21.95
The Puzzler (ColorConnection)	4-up	32K-disk	29.95

Computer Island

MATH

PROGRAM TITLE	GRADES	MEMORY	PRICE
Opening a Bank Account	4-7	32K-disk	24.95
Dollars & Sense	2-4	16K-Ext.	14.95
McCoco's Menu	3-5	16K-Ext.	14.95
Moneypak	2-5	32K-Ext.	24.95
Graph Tutor	3-7	32K-Ext.	19.95
Graph-It	7-up	16K-Ext.	14.95
Math Invaders	1-8	16K-Ext.	17.95
Mathquiz - 4 operations	2-5	32K-Ext.	19.95
Addition & Subtraction	2-3	16K	11.95

Skill Tutor Series

PROGRAM TITLE	GRADES	MEMORY	PRICE
Division Tutor	3-7	16K-Ext.	14.95
Multiplication Tutor	3-7	16K-Ext.	14.95
Factors Tutor	5-8	16K-Ext.	19.95
Fractions Tutors (3 programs)			
addition, subtraction or multiplication	4-8	16K-Ext.	19.95ea.
Trigonometry	8-10	32K-Ext.	24.95
Equations Linear	7-9	32K-Ext.	19.95
Equations Quadratic	8-11	32K.Ext.	19.95
Arith. Diagnostic Disk	3-8	32K-disk	49.95
Fraction Diagnostic Disk	4-9	32K-disk	49.95

Verbal Problems Series

PROGRAM TITLE	GRADES	MEMORY	PRICE
Distance Problems	5-8	32K-Ext.	19.95
Area & Perimeter	5-8	32K-Ext.	19.95
Pizza Game	3-5	32K-Ext.	19.95
Sales & Bargains	6-8	32K-Ext.	19.95
Comparison Shopping	4-7	32K-Ext.	19.95
Binary Dice Game	4-up	32K-Ext.	19.95

SOCIAL STUDIES

PROGRAM TITLE	GRADES	MEMORY	PRICE
Know Your States	5-up	32K-Ext.	19.95
History Game	5-up	32K-Ext.	14.95
States & Capitals	5-up	32K-Ext.	19.95
Explorers & Settlers	4-up	32K-Ext.	19.95
Famous American Women	6-up	32K-Ext.	19.95
Street Map Game	3-5	32K-Ext.	19.95

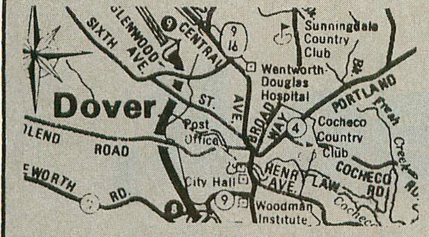
MISCELLANEOUS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Name That Song 1,2,or 3	2-up	16K-Ext.	11.95
Music Drill	3-up	16K-Ext.	19.95
Science Game	8-up	32K-disk	29.95
Computer Literacy	6-up	32K-Ext.	19.95
5 Educational Programs with Lightpen	1-2 or 3-6	32K-disk	44.95
Chemistry Tutor	10-up	32K-disk	29.95

Disk indicates available on disk only.
Tape prices given.
Add $5.00 for any program on disk.

The Educational Answers

SCIENCE GAME
32K EB - disk only/$29.95
Over 600 questions in 9 categories. Makes learning science facts fun. Game format, 1 or 2 players, teams. Grade 8 and up.



STREET MAP GAME
32K - $19.95 tape/$24.95 disk
Hi-res. screen and graphics portray a typical section of a street map. This one shows people's homes, the school, the park, etc. Questions on how to get from one place to another are asked and the footsteps are shown.

CHEMISTRY TUTOR
32K - disk only - $29.95
A hi-res. 4 part program that drills high school students in Elements, Symbols, Naming Compounds, Common Ions, and Balancing Equations. Correct answer given after 2 incorrect responses. A valuable tool for studying chemistry.

5 LIGHTPEN PROGRAMS
32K EB - $44.95
Five menu driven educational programs designed for children in grade 1 and 2, and special educational students. Basic addition, basic multiplication, shape series matching, number series matching and word rhyming are included. All on a HI-RES screen, with graphics. User need only to use the light pen to operate the programs. **(LIGHT PEN INCLUDED)**

VERBAL MATH PROBLEMS

PIZZA GAME
32K EB - tape/$19.95
Learn to locate coordinates on a grid. HI-RES text and graphics.

AREA & PERIMETER
32K EB - tape/$19.95
Triangles, rectangles, and circles are covered in this HI-RES text and graphics program.

SALES & BARGAINS
32K EB - tape/$19.95
Learn to find the discounted price. HI-RES text and beautiful graphics.

DISTANCE PROBLEMS
32K EB - tape/$19.95
Moving graphics and text combines on a HI-RES screen. Rate x Time = Distance in all its forms.

STREET MAP GAME **32K E.B.**
$19.95 Tape **$24.95 Disk**
Hi - res screen and graphics portray a typical section of a street map. This one shows people's homes, the school, the park, the post office, etc. Questions are asked on how to get from one place to another and the footsteps are shown after response. A fun way to improve map skills.

OPENING A BANK ACCOUNT
32K - Disk Only - $24.95
A set of programs designed to introduce and provide practice in the skills of filing out bank applications, deposit and withdrawal slips, and computing bank account balances. Loaded with graphic presentations. Grades 3-6.

$$$

DOLLARS & SENSE
16K-Ext. - $14.95 tape/$19.95 disk
Learn to make purchases. Graphic displays of items kids love. Player buys items using dollars and coins to practice using money correctly. Solutions given.

McCOCO'S MENU
16K-Ext. - $19.95 tape/$24.95 disk
America's favorite pastime-going out to eat. Learn to buy and add up your purchases from a typical fast food restaurant menu. Gain skill in using money. Different prices each time.

COCO WHEEL OF FORTUNE
32K - $19.95 tape/$24.95 disk
Hi-res. graphics and screen in this version of the popular TV show. 1-6 players. Spin the wheel for points and guess a letter to solve one of the 200 puzzles. Have fun while strengthening LA skills.

COLORGRADE
32K - disk only - $29.95
An easy to use classroom grading program. Keeps grades for up to 6 classes of up to 40 students per class. Many options including weighted averages and hard copy to printer.

RAINBOW
CERTIFICATION
SEAL

Computer Island

(718) 948-2748

VISA

Dept. R 227 Hampton Green, Staten Island, N.Y. 10312

MasterCard

Send for catalog with complete descriptions.

Please add $1.00 per order for postage. N.Y. residents, please add proper tax. FREE set of BINARY DICE, including full directions, with orders of 2 or more items.

Dealer Inquiries Invited. TRS-80 Color Computer **All Payments in U.S. Funds.**

EPROM UTILITY

An easy way to determine EPROM erasure times

Now You See It, Now You Don't!

By Marty Goodman

According to reports by the makers of CoCo EPROM programmers, over 2,000 Color Computer owners have EPROM programmers. These programmers are an essential tool for those wanting to customize their ROM software or wanting to make alternate character sets of their lower kits or 80-column cards.

All owners of EPROM programming devices will want to have an EPROM eraser. The eraser is simply a box with an ultraviolet light that has a particular peak wavelength output (2,537 Angstrom units). When this light is shined on an EPROM, it erases what has been programmed into it. But, how long does this process take? There is often much confusion about this and I have a simple answer.

Get several of the EPROMs you usually work with. Program them with all zeros. This sets every bit inside the EPROM (an erased EPROM is set at all ones). Be sure to clean the quartz windows on used EPROMs with lighter fluid because particles of grease and adhesive can impede erasure.

Put the programmed EPROMs into the eraser and expose them to the UV light for one minute. Take them out and check to see if they are erased. If they are, the eraser is too strong. Try to increase the distance between the EPROM and the light bulb and try again.

Continue the process of putting the EPROMs into the eraser and checking every 30 seconds. This way, you can determine the apparent time of erasure. This time should be between one and one-half and seven minutes. To determine the proper erasure time, multiply this apparent time by five. For example, if the chip is not erased at the one and one-half minute check, but is at two minutes, the time for that brand and type of chip in that particular erasure is 10 minutes.

There may be significant variations between different brands and types of chips. My tests indicate most 27 series EPROMs behave about the same, but the Motorola 6876X series appear to take somewhat more time to erase.

Note that this technique requires nothing other than a clock, an EPROM burner and the EPROM eraser. It is far simpler, and more accurate, than any attempt to calculate the theoretical time needed for erasure using the manufacturer's specification for "nominal erasing energy" reported in watt-sec/cm-cm and the rated energy output of your UV bulb.

My source for this information is an old article on erasing 1702-type EPROMs. Note it is not proper to merely expose an EPROM to UV for the minimum time needed for it to appear erased when read in the EPROM programmer. The cells in the EPROM that hold the information will not be fully discharged and may later cause it to behave erratically.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator on CompuServe and Delphi.

RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little cassette symbol on the table of contents and at the beginning of articles indicates that the program is available through our RAINBOW ON TAPE service. An order form for this service is on the insert card bound in the magazine.

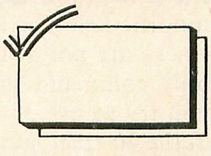
What's A CoCo?

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. It is easier than using both of the "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

The Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS,* type in the program and CSAVE it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down-arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

Using Machine Language

Machine language programs are one of the features of THE RAINBOW. There are a number of ways to "get" these programs into memory so you can operate them.

The easiest way is by using an editor/assembler, a program you can purchase from a number of sources.

An editor/assembler allows you to enter mnemonics into the CoCo and then have the editor/assembler assemble them into specific instructions that are understood by the 6809 chip, which controls your computer.

When using an editor/assembler, all you have to do, essentially, is copy the relevant instructions from THE RAINBOW'S listing into CoCo.

Another method of getting an assembly language listing into CoCo is called "hand assembly." As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand-assemble some programs.

Use the following program if you wish to hand-assemble machine language listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I,VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00 and change the value of I to &H7F80.

The Rainbow Seal

RAINBOW
CERTIFICATION
SEAL

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has been physically seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Add an extra 22K of memory to Disk BASIC 1.1

Discover the 'Hidden' Five Tracks

By Jim Peake

If you own the new white Radio Shack disk drive (catalog number 26-3029) with Disk BASIC 1.1, you may have a 40-track drive masquerading as a 35-track drive. The new drives without the little tab to eject the disk are different from the old gray drives.

After more than three years of cassette loading, I broke open the piggy bank and bought a new drive in December 1983. Sure enough, it looks different. Rumor has it that it's a Model 4 drive from TPI. After six months of loyal service on my 1980-vintage D-board CoCo, I attached it to my new 64K CoCo 2. After experimenting to see how many tracks it really has, I discovered it works fine as a 40-tracker.

I've written a small program of POKEs to modify the disk ROM for 40 tracks. To use it, you must have a 64K CoCo. You must also have a program to load the BASIC ROMs into the upper 32K of RAM, and switch the CoCo to the all-RAM mode. And you must have the new Disk BASIC 1.1 ROM. This change does not work with the 1.0 ROM because all the POKE addresses are different and you would need 40-track drives rather than the 35- or 36-track gray drives.

So how do we make Disk BASIC 1.1 use 40 tracks? There are several things that must be done. First, move the ROMs to RAM and switch to the all-RAM mode so we can make changes with the POKE command. Second, BASIC must be modified to initialize 40 tracks with the DSKINI command. Third, the file allocation table, which keeps track of what granules have been used, must be enlarged to keep track of 78 granules instead of 68. Changes have to be made so it is all saved to disk and not cut off at 68. Next, FREE has to be modified to look for 78 granules.

I did not make the directory allow for more than 68 files because, as a practical matter, I cannot believe anyone would want that many files on one disk.

The file allocation table is easy enough to expand, but doing so limits the system to a maximum of three drives. This is because the system initialization routine reserves space for up to four file allocation tables. Since each table is 10 bytes bigger to hold 78 instead of 68 granule pointers, there is not enough room for more than three file allocation tables. Again, it's much too complicated to move all subsequent work addresses and not worth the trouble.

The advantages of this modification for using 40 tracks are many. You can save money by using fewer disks. This modification is fully compatible with the diskettes already formatted in the official 35-track format. They operate normally while in the 40-track mode and are protected from unsuccessful attempts to use the last five tracks. The file allocation table indicates to the modified 40-track system that those tracks are not available. BACKUP is the only command that invites disaster if you try to use 35-track diskettes while in the 40-track mode.

There are some disadvantages to this 40-track modification. If you run the system without loading the modification, the unmodified system wreaks havoc with 40-track diskettes. It shortens the file allocation table to 68 granules, thus losing forever the last five tracks. Any files or programs that used any or all of that area are unusable, and the diskette will be a 35-track disk until reinitialized to 40 tracks, which wipes out everything on the diskette. It is also a nuisance to have to load the necessary

---

Jim Peake lives in Northfield, Vermont, and is a systems analyst for the state. He has over 12 years of applications software experience. He purchased his first CoCo in 1980 and his family has rarely seen him since.

programs for converting to 40 tracks each time you turn on the computer.

Of course, if you have an older drive that does not support 40 tracks, attempts to use the last five tracks result in an I/O error. And if Radio Shack or its supplier adjusts the drives to prevent using the last five tracks, then this modification won't work. I think the system is set up for upgrading to 40-track drives and Radio Shack probably will. If they do, they will have to put in a few more checks than I did to ensure full compatibility with diskettes previously formatted for 35 tracks.

One last caution: This modification has not been rigorously tested in a variety of environments. Therefore, experiment carefully and test it to be sure it works dependably on your system before entrusting valuable data or hard work to it.

One does not start disassembling the ROMs without a good, comprehensive map of what's what. In my case, the map and guiding light was the complete CoCo memory map published in the July, August, September and December 1983 issues of THE RAINBOW.

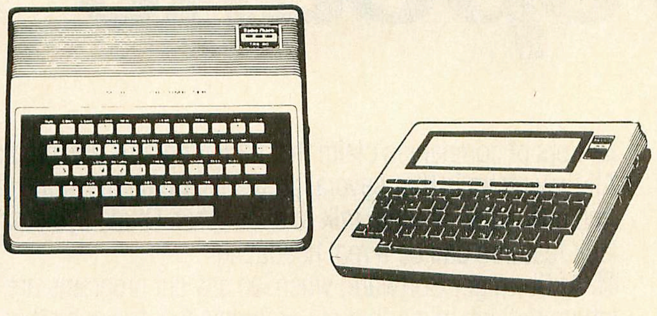
In conclusion, the new 1.1 system can easily be modified to use 40 tracks for storing up to 178,000 bytes of data on each diskette.

(Mr. Peake can answer questions about this program at 802-485-8922, 7 p.m. to 9 p.m. EST only.) ☐

The listing: TRACK40

```
1000 REM ROUTINE TO SET DISK
     BASIC 1.1 TO 40 TRACKS IN
     A 64K COCO
1001 ' WRITTEN JUNE 1984
     BY JIM PEAKE
1002 ' NOTE:: LIMITS TO A MAX OF
     3 DRIVES
1005 POKE&HD762,&H02 ' SETS
     DSKCON TO RETRY 2 TIMES
     INSTEAD OF 5. OPTIONAL MAY
     BE OMITTED.
1010 POKE&HD65F,&H28:POKE&HD682,
&H28  ' SETS DSKINI TO 40 TRACKS
1015 POKE&HD534,&H27 ' SETS DSKI
1020 POKE&HD29D,&H28 ' SETS DSKO
1030 POKE&HC735,&H4E ' SETS MOVE
     OF FILE ALLOCATION TABLE TO
     10 MORE GRANULES
1035 POKE&HC75A,&H54 ' INCREASES
     SPACE FOR EACH DRIVE'S FAT
     TO ALLOW 10 MORE GRANULES
1040 POKE&HC7BB,&H4E ' SETS MOVE
     OF FAT TO 10 MORE GRANULES
1045 POKE&HC7D0,&H4E ' USE 78
     GRANULES NOT 68
1050 POKE&HC7EF,&H4E ' USE 78
1055 POKE&HCD26,&H4E ' SEARCH 78
     GRANULES
1060 POKE&HCEB5,&H4E ' LET FREE
     COMMAND CHECK 78 GRANULES
1065 POKE&HD44D,$H4E ' SET COPY
TO 78 GRANULES
1080 POKE&HD7C0,0:POKE&HD816,&H1
4 ' SET TO 6MS STEPPING RATE
```

TANDY COMPUTER DISCOUNTS

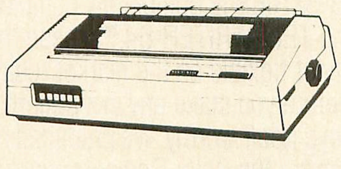


COLOR COMPUTERS

26-3127 64k color comp	165.00
26-3131 1st disk drive	269.95

PRINTERS

26-1276 DMP 105	160.00
26-1277 DMP-430	660.00
26-1278 DWP-220	425.00
26-1280 DMP-130	269.00



MODEL 4 and MSDOS COMPUTERS

25-1000 mod 1000	700.00
25-1004 128K memory board	169.95
25-1005 2nd drive mod 1000	160.00
26-3211 Monochrome monitor	125.00
26-1070 mod 4D 64k 2dr.	920.00
26-5103 mod 2000 2dr.	1,400.00
26-5104 mod 2000 HD	2,200.00

We Carry the Complete Line of Tandy Computer Products at Discount Prices

CALL FOR A FREE PRICE LIST 800-257-5556
IN N.J. CALL 609-769-0551

WOODSTOWN ELECTRONICS
Rt. 40 E. WOODSTOWN, N.J. 08098

Some companies will tell you their programs are integrated.

Derringer software speaks for itself.

Lots of companies claim that their programs are integrated. All they mean is that several programs are on the same disk. And only a few of them talk to each other. Crude systems that lack features can be a real headache.

At Derringer Software, when we say our programs are integrated, we mean that our programs *talk* to each other. Our PRO-COLOR-SERIES is completely compatible with DYNACALC® and TELEWRITER-64.™ These three programs are among the most flexible on the market today.

Investigate before you make any investment. Derringer Software will prove itself worthy. We produced the first serious database program for the Color Computer back in 1982. And it has remained the popular choice ever since. Now that's really saying something!

Derringer Software, Inc.
PO Box 5300, Florence, SC 29502-5300
To place an order by phone, call: ***(803) 665-5676***
10 AM and 5 PM EDT
Canadian Distributor-Kelly Software
Australian Distributor-Computer Hut Software

PRO-COLOR-FILE

©1984 by Derringer Software, Inc.

ENHANCED 2.0

- 60 Data Fields for each record
- 1020 spaces available per record if needed
- Maximizes multiple drive operation
- 28 equation lines (+ − * /)
- IF-THEN-ELSE logic test in equations
- Full Screen editing on up to 4 data entry screens
- Key click and auto key repeat
- Stores custom designed report formats
- Obtain totals, averages, or summaries for any field
- Output reports to printer, screen, or disk file
- Send data out to a DYNACALC compatible file
- Separate label generator for up to 10 across labels
- Pre-define up to 16 indexes for searching/reporting file
- Sorts 750 records in under 5 minutes
- User defined selection menus
- Repeated tasks performed with one keystroke
- Comes with 75 pages of documentation in a 3 ring binder
- Supported by a national users group
- Full time programmer support
- Supplied on an unprotected disk

$59.95

PRO-COLOR-FORMS 2.0

©1984 by Derringer Software, Inc.

PRO-COLOR-FORMS will access data files created with PRO-COLOR-FILE and merge them with a letter or place them on pre-printed forms.

• STORE UP TO 6 FORMATS • USER DEFINED PAGE SIZE • SUPPORTS SPECIAL PRINTER CONTROL CODES • RIGHT JUSTIFICATION • PASSWORD PROTECTION • MERGES WITH GRAPHICS FROM MASTER DESIGN OR TELEGRAPHICS •

PRO-COLOR-DIR

©1984 by Derringer Software, Inc.

PRO-COLOR-DIR will read your directories and create a master data file that can be accessed by PRO-COLOR-FILE for sorting and reporting. 1000 + records can be stored on one diskette with valuable information about each program.

You can obtain hard copies of the information and create labels of the filenames for placing on the diskette itself.

• DISK ID NAME • FILENAME/EXT • TYPE OF FILE • DATE CREATED • DATE UPDATED • NUMBER OF GRANS ALLOCATED • NUMBER OF SECTORS ALLOCATED AND USED • MACHINE LANGUAGE ADDRESSES •

$29.95
FOR BOTH

DYNACALC©

SPREAD SHEET FLEXIBILITY
(Includes Dynagraph + Sidewise)

$79.95

Telewriter-64™

WORD PROCESSOR POWER

$54.95

CoCo Max II

GRAPHICS SUPERIOR

$79.95

MASTER DESIGN

©1984 by Derringer Software, Inc.

Generates lettering in hi-res graphics that can be different sizes, skinny, bold, textured, drop shadowed, raise shadowed or tall. Also interfaces with the Telewriter-64 word processor for printing hi-res displays with your letters.

Take full advantage of all the extended BASIC hi-res graphic commands including boxes, circles, lines, copy displays and utilize GET and PUT features. Added commands include mirror reflection, turn displays backwards or upside down. Squish displays, create dot patterns for shading or diagonal lines.

The Letterhead Utility allows you to access hi-res graphics from Telewriter-64, your own BASIC programs or PRO-COLOR-FORMS.

Interfaces with dot matrix printers having dot addressable graphics.

See reviews in:
July '84 Rainbow, Oct. '84 Hot CoCo

$29.95

DYNAGRAPH

©1984 by Derringer Software, Inc.

A UTILITY PROGRAM FOR OWNERS OF DYNACALC®

DYNAGRAPH will transfer graphic files from DYNACALC to standard graphic files for further enhancing and labeling by graphic editing programs such as MASTER DESIGN, CoCo Max or Graphicom.

DYNAGRAPH can also reduce a graph vertically and horizontally so that multiple displays can be combined into one.

$19.95*

* included FREE with DYNACALC®

Max Edit

©1985 Snard Enterprises

A FONT EDITOR FOR COCO MAX

- Edit current fonts
- Create New Fonts
- Design Symbol Fonts
- Comes with pre-defined fonts
- CoCo Max I & II Compatible

(disk only) **$19.95**

Written by: Michael W. Shawaluk
CoCo Max® is a registered trademark of Colorware.

SIDEWISE

©1984 by Derringer Software, Inc.

Add a new "twist" to your printer's capabilities!

SIDEWISE makes your printer do something you never thought possible—print side ways!

SIDEWISE will read in any ASCII text file and print it out side ways using a Radio Shack, Epson, Okidata, C-Itoh or Gemini printers having dot-graphics ability.

SIDEWISE OS9 is compatible with DYNACALC OS9 and requires Basic09

SIDEWISE OS9 (Disk only) **$39.95**

SIDEWISE RS-DOS **$24.95***

* RS-DOS version included FREE with DYNACALC®

OS9 is a registered trademark of MICROWARE and MOTOROLA.

TELEGRAPHICS

©1984 by Derringer Software, Inc.

PRINT HI-RES GRAPHICS USING TELEWRITER-64!

Use CoCo Max, Graphicom or other graphics programs to create letter heads and print them while using Telewriter-64.

Telegraphics interfaces with Radio Shack, Epson, Gemini, C-Itoh and Okidata printers having dot-addressable graphics. A simple modification to Telewriter-64 will allow you to exit Telewriter via the DISK I/O MENU and print out the graphic without affecting any of your text in the buffer.

This is the same feature that is included in our MASTER DESIGN program. Since we felt you don't need to buy two graphics editing programs, we have made this feature available at a reduced price.

(Available Only On Disk) **$24.95**

Telewriter-64 + TELEGRAPHICS - ***$64.95***
(Save $20)
CoCo Max II + TELEGRAPHICS - ***$84.95***
(Save $20)

NO OTHER DISCOUNTS APPLICABLE

@ SUMMARY

©1985 Derringer Software, Inc.

If you use your spreadsheet program to keep track of your expenses then @SUMMARY can help you analyze those expenses. For example, if you indicate a "Category" for each expense then @SUMMARY will produce a report that shows a total for each category, the highest amount, the lowest amount and the average amount. In addition, @SUMMARY can produce a hi-res line graph or bar graph of the analysis and allow you to place titles on the graph. A hardcopy of the graph can also be generated as well as saved to disk.

The analysis can be saved in a "data file" which can be loaded into DYNACALC or read in by @SUMMARY for future additions to the analysis. If you use other Spreadsheets such as ELITE*CALC then you have added a graphing feature to your spreadsheet applications. The analysis can also be saved in an ASCII file which can be read by word processors for inclusion in a report.

@SUMMARY is compatible with any spreadsheet program that can generate an ASCII text file of worksheets.

Specify RS-DOS or OS9*

**OS9 version does not have Hi-Res graphing and requires Basic09.*

(disk only) **$19.95**

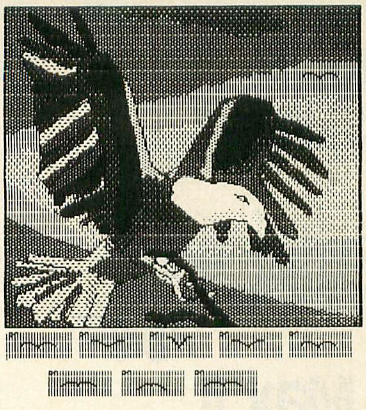
DYNACALC® is a registered trademark of Computer Systems Center
*ELITE*CALC is a trademark of Elite Software*
OS9 is a registered trademark of MICROWARE and MOTOROLA.

Check, Money Order, VISA or MasterCard **Include $3.00 for UPS Shipping - $5.00 U.S. Mail - $9.00 Air Mail** South Carolina residents add sales tax.

MORETON BAY SOFTWARE

MORE GOOD SOFTWARE

GRAPHICOM
  3 disk package $29.95
  64K EXB disk
SAM DIAMOND
  graphic adventure $29.95
  32K EXB disk
HOT SLOT
  casino simulation $24.95
  32K EXB disk or tape
ECLIPSE
  excellent pixel editor . . $19.95
  64K EXB disk



THE MOTION PICTURE

A complete animation development system for your CoCo! An object oriented graphic screen developer. Using this tool you can quickly and simply animate your pictures. Take standard graphic screens that you develop and incorporate them into MOTION PICTURES. Animate up to eight frames, yielding smooth animation. Generate screens from objects and build screens from stored object files. Included are routines to display animation from BASIC. We believe you'll like this program, so we make this offer: We will send you a demonstration disk for $4.00 which you can apply as a credit if you buy the program. Requires 64K. Disk, $39.95.

A SUPER COLOR PRINTER
The OKIMATE 20
AT A SUPER LITTLE PRICE!

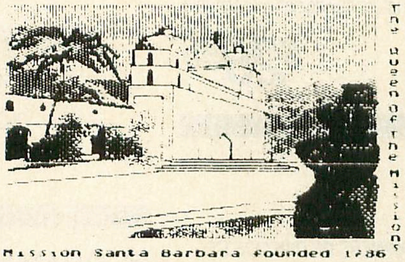
Prints ten characters to the inch, twelve characters fifteen characters to the inch.
Italics. Italics. Italics.

Underline^{Superscript} $_{Subscript}$

Small. Light weight. Quiet. Prints up to 80 characters per second. Prints four color graphics. Includes disk software for black and white, two color and four color screen dumps of Color Computer hi res graphics.

Okimate 20, Plug 'n' Print, paper, black and color ribbon, instructions, software and cable for:

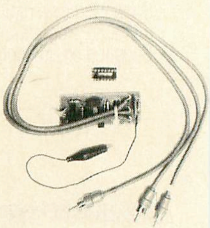
Serial $220.00
Parallel $210.00
$10.00 Shipping



Only screen dump program for the Color Computer to the Okimate 20

DOUBLE DRIVER I

The BEST monitor driver available. Color composite, monochrome and audio output. For original CoCo D, E and F boards. $24.95.

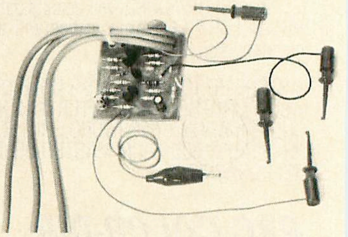


MONO II

Mono II for Color Computer 2. An excellent monochrome monitor driver that has audio output also. Specify model needed.

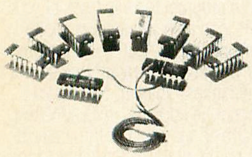
$24.95.

DOUBLE DRIVER II



Finally a monitor driver for the Color Computer II that lets you use a monochrome and a color monitor simultaneously. We're proud of this new driver. The six transister circuit provides optimal signal mixing and signal gain. Excellent monochrome output and better quality resolution in the color ouput than any driver we have seen. Audio output also. Fits all models of the Color Computer II. $29.95.

64K UPGRADES



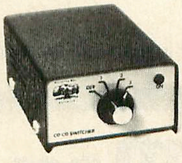
Guaranteed Pretested

E Board (solderless - pictured) $39.95
F Board $26.95
CoCo 2 (except 26-3134A&B and 26-3136A&B) $26.95
CoCo 2 (models 26-3134A&B and 26-3136A&B $39.95

Having trouble with your CoCo? We have the chips you need. Call us. (805) 962-3127

THE COCO-SWITCHER

A QUALITY PIECE OF HARDWARE



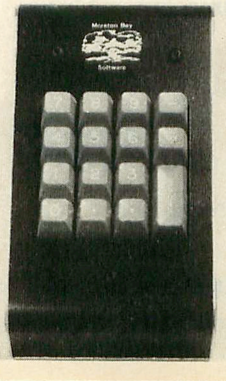
The CoCo Switcher allows you to hook u three peripherals to your RS-232 jack. Connect your modem, printer and any othe RS-232 compatible peripheral to the CoC Switcher. An LED on the CoCo Switche shows if your computer is on or off at a glance The LED flickers when transmitting or receiving data.

$39.95 plus $2.00 shipping and handling

MORE KEYS

At last a quality numeric keypad for your Color Computer. This 15 key numeric pad plugs inside your computer and gives you the convenience of rapid numeric data entry. Dimensions: length 6½" (165mm), width 4" (101 mm), height 3" (76 mm). Baked black enamel finish. Specify computer model. MORE KEYS complete with cable and connector.

$69.95



MORETON BAY SOFTWARE

A Division of Moreton Bay laboratory
316 CASTILLO STREET
SANTA BARBARA
CALIFORNIA 93101
(805) 962-3127

VISA
MasterCard

Ordering information

Send $2.00 shipping and handling per order. We ship within 1 working day on receipt of order. Blue Label Service available. California residents add 6% sales tax.

Database Ditties . . .

By Cray Augsburg
Rainbow's CoCo SIGop

There have been a lot of goings-on in our Color SIG, including a large amount of activity in the databases. Because of this, most of this month's column is devoted to Marty Goodman's database report.

Color SIG is rapidly increasing in size. We have 2,989 members and expect to have well over 3,000 members within a few weeks.

We have unofficial reports of our Forum activity versus the message activity on CompuServe. We average 380 posted messages a week to CompuServe's 430. This ratio, too, is rapidly changing in our favor.

There is a decrease in the number of users having problems adjusting to Delphi. Most people are finding it easier to use than "that other system."

Contest Results

We recently had a contest to see who could write message number 6809. The "magic message" was written by Lloyd Pulley (FATONE). After winning, all Lloyd could say was, "I just logged on to see who won and now I find out it's me!" For his effort, he will receive a free 72-hour period on the Color SIG. Keep an eye open because we will be having similar contests in the future.

Missing Words

Here is a correction for the May "Delphi Bureau." At the top of Page 94, I describe how to locate specific RAINBOW ON TAPE files. Missing are the rules that explain this. They are:

1) To find a specific file, type `READ MM/YY XXX Title` where `MM/YY` is the date and `XXX` is the page number. The title may be omitted.
2) If the month (`MM`) has only one digit, such as February, then do *not* include a leading zero.
3) If the page number (`XXX`) has only two digits, then *do* use a leading space.

The examples should now make sense.

Strike up the Band Already!

Everything appears to be running smoothly on the Color SIG. We have lived up to our word and now submissions to the database are being enabled usually within 24 hours.

The only area that causes some concern is the Music topic of the database. As a music lover, I find the lack of activity there disconcerting (pun fully intended). I urge all members to search through their files at home. Surely you can find at least one or two music files you would like to submit.

Keep in mind that there are several people with considerable experience who "reside" on our Color SIG. If you have any questions, you can always leave them in Forum. They are sure to be answered quickly. Now let's see what good news Marty has to bring us . . .

Cray Augsburg serves as RAINBOW's technical assistant and holds an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is RAINBOWMAG.

Database Manager's Report

In the four weeks that have gone by since I assumed the job of database manager on Delphi, quite a lot has happened in our CoCo SIG database.

I have posted some new text files that may be of interest, including one on *legal* telephone "phreaking," describing how I cut my Delphi telephone bill from $150 to $13 per month. A new *NEWBOX* file is more speculation about the coming Color Computer. There's also an essay on the issue of *pornography*, and how it relates to our SIG.

Graphics

We have four new art galleries containing 12 to 20 pictures each by famous CoCo artists Ana Landa, Ron Kiyomura, Linda Neilson and Erik White. These are among the best CoCo art ever produced. Many are winners of RAINBOW's "CoCo Gallery" awards.

There are a number of new individual files, including *Red Riding Hood*, an enhanced video digitized image. Also in the Graphics section is a digitized and animated image of guess who, under the heading GUESS WHO.

Stephen Macri (**DRACMAN**) has given us a nice updated anatomical chart of the brain, with special attention to CoCo-related functions. Mark Kowit (**TOBOR8**) has contributed a set of three enhanced digitized images, including a clever one called *Eat Strawberries*. Erik Gavriluk (**ERIKGAV**) has uploaded a gallery of 15 digitized images, including a particularly interesting one, *Baby*.

Graphicom is well-supported in the database, with alternative menus and font set screens. If more *Graphicom* users will drop me a line on the Forum or in MAIL, I can upload a *lot* more alternate *Graphicom* fonts and stamp sets. All you need do is ask. I have about a 50 or more such files.

We also have a fresh upload of *McPaint*, a "guiltware" product (you are asked to send the author a few bucks if you like and use the program). This is a graphics editor for the CoCo vaguely similar to *Graphicom* and *CoCo Max*. Along with the new *McPaint* upload, we have a set of about 15 fonts for *McPaint*. And from the same authors (**Eric Gavriluk and Greg Miller**) we have a set of *Animate* utilities that allow you to make (and hopefully later upload to us for all to see) short animation sequences from the pictures you draw. Best of all, Erik and Greg, the talented creators of *McPaint* and *Animate*, are available on our forum for questions.

Art Flexser has contributed his *MAXCMP* utility to our graphics section. This utility allows you to convert CoCo graphics screens from *Graphicom, CoCo Max* and other graphics editors into our *.PIX* format, an ASCII BASIC version of the picture that can be downloaded. I recommend that anyone who wants to upload CoCo art to Delphi or other BBS systems get and use this file.

Loren J. Howell (**XENOS**) has given us a CGP-115 (color printer plotter from Tandy) screen dump for full-color dumps of *CoCo Max* files.

Hardware Hacking

I have uploaded in this section all of my software development tools for creating character generator ROMs for the PBJ *Word-Pak I*, and for all makes of CoCo lowercase kits. There are also some data files with my favorite fonts sets for such things. All you need to do is download those data files and burn them into an EPROM, and you can customize your screen character font if you own a lower kit or PBJ *Word-Pak*. There is also an article by Don Hutchison on how to interface a Microfazer buffer to the CoCo, and a chart I made of the pinouts of most common EPROMs.

Also in the Hardware Hacking database is an alternate driver software for the Intronics Ver. 2 EPROM programmer. With this patched software (which I wrote), you will have the option of proper slow programming of EPROMs, a needed option due to reports of unreliablity in the long-term data storage of EPROMs programmed with that programmer in its normal (fast) mode.

Data Communications

Art Flexser has uploaded a series of fixes for *Colorcom/E* Version 3. These patches allow you to correct some serious flaws in the currently released version.

Don Hutchison (**DONHUTCHISON**) has given us a superb discussion of the workings of 1200 Baud modems and addresses the question of whether or not it pays to get one.

Steve Bjork (**6809ER**) has uploaded the latest revision of his conferencing program, *COTERM*. Be sure to get this one if you use Delphi's conference area a lot. It offers a *split screen* to make it easy to compose your outgoing messages.

Also present are some patches for *Mikeyterm 4.0* to allow you to use its autodialer function (control 3) with a Hayes modem. Thanks once again to Mike Ward, its author.

Utilities

There is now a full set of Intel Hex to CoCo binary, and vice versa, utilities in this topic area, along with a full description of *just what* Intel Hex is. I wrote and uploaded this. Keith W. Smith (**UGLY**) has uploaded the *Ugly Wordprocessor*, a simple line editor for quick jobs. Cray Augsburg (**RAINBOWMAG**) has uploaded some tax preparation utilities (*TAX*), a pie chart utility (*PIE*), and some other new files as well.

Games

Cray Augsburg has submitted a number of new games from RAINBOW's collection. (None of these has appeared in the magazine, however.) And Stephen Macri has submitted a very clever golf Simulation.

Assembly Language

Don Hutchison has uploaded source code for three neat little ditties. *NUTRAX* formats an extra five tracks on 35-track CoCo disks without hurting existing information (great for hackers moving up to a 40-track version of Disk BASIC). *Color Zoom* is a visually pleasing bit of clever code that the authors of *Graphicom* got from an old CoCo game, modified and gave to me. I gave it to Don, and he commented it and turned it into a good assembly language tutorial.

Product News and Reviews

In this database topic are reviews of the latest Radio Shack games, *Pegasus, Donpan* and *Pitfall II*, and a report on the DS69A Video Digitizer. Also in this section is my reply to RAINBOW regarding their review of a newly released EPROM programmer.

I have a review of the VIDCODIT video digitizer, a $40 bare board kit sold by Dick Kinney that does a rather fine job of digitizing a video signal, though it is pretty hacker-oriented. Buried in that review are three digitized pictures of me, taken as samples of the performance of the unit.

OS-9

We have a description of how to make the *Version 2.0 OS9 CO80* driver work with the DISTO 80-column card.

Greg Forseth has given us some RAM disk software for OS-9 and the Banker 256K expansion.

Rob Wyatt (**ROBERTJR**) has uploaded a pause utility command.

Coming Attractions

Look for more product reviews, including one of the Tandy Hard Drive Controller and Drive for the CoCo. And look for a *Kermit* supporting terminal program in the Data Communications section of the database. In hardware, I hope to soon have a sophisticated, all-machine language driver program for the Green Mountain Micro Color Burner, complete with point-and-pick menus and bar graph displays of what percent of the EPROM is programmed. And, in Graphics, more pictures and more *Graphicom* font screens.

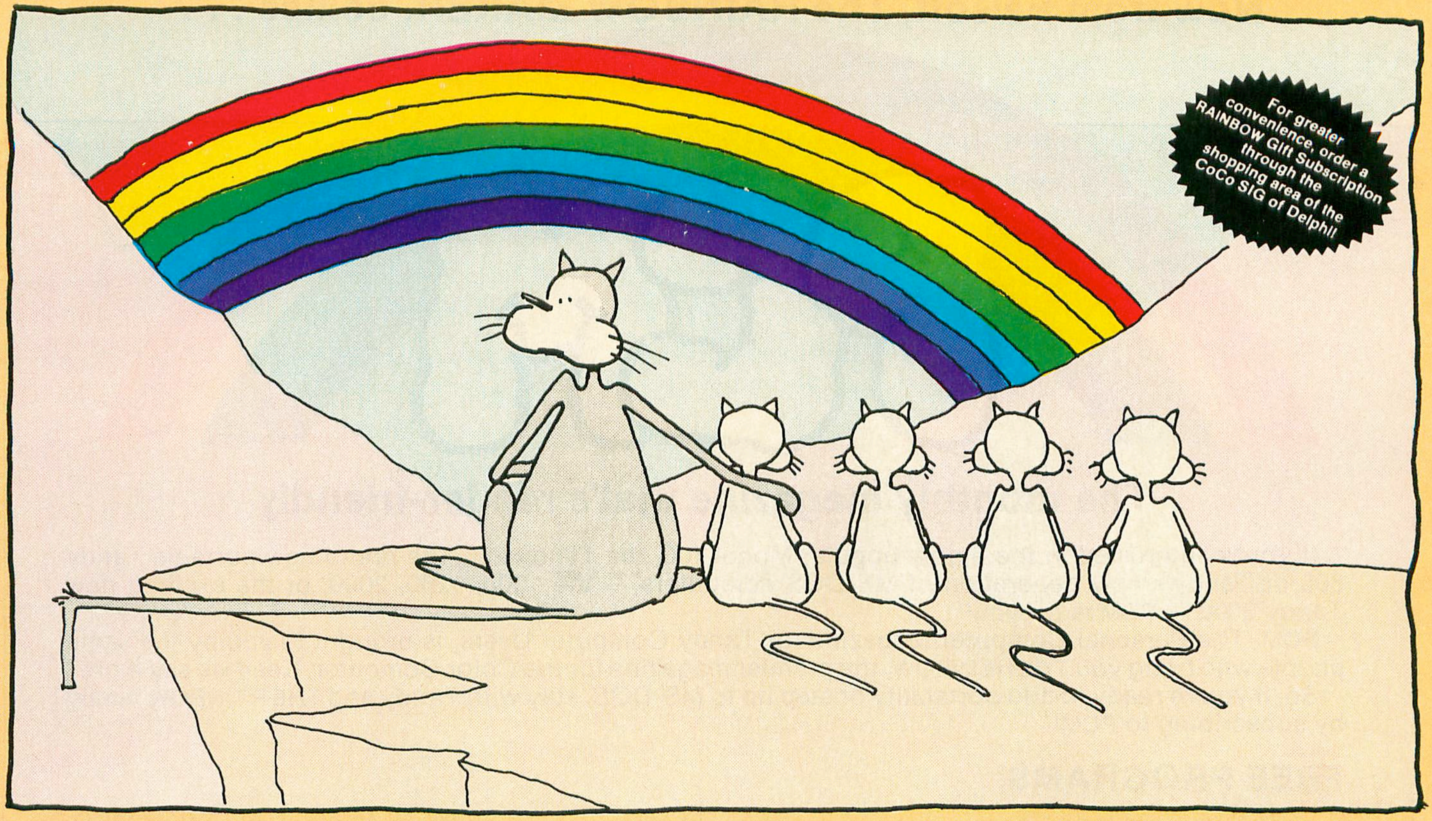
Coming soon to the Graphics section is a superb dedicated *Fat Bits*-type screen editor, one that has a mode in which you can do "fat bits" (enlarged) editing of artifact color screens with the magnified pixels appearing as red, blue, white or black on your screen. The total area shown in the magnifier is larger than in any other graphics editor's "fat bits" program, and the ease of use of this utility is good.

Soon, I will release my *C64-to-CoCo Converter*, a program that allows CoCo owners to download Commodore 64 *Doodle* format files, then view them on their CoCos. We will show a few representative converted *Doodle* art files, and you will be able to find many more on the Micro Artists (*MANIAC*) SIG on Delphi.

In the Data Communications topic area on our CoCo SIG, we hope to soon have the complete *WEFAX* program set and the full documentation for it and, later on, possibly some interface-less RTTY/CW software as well. (This last by the authors of *Graphicom* and *WEFAX*.) We may later feature a number of tutorial files in our assembly language database for beginning and intermediate ML hackers.

There has been a heavy emphasis on graphics in this report. This is due in part to my own great interest in this area. Remember, we welcome submission of all material. I will try to develop other areas now that the Graphics section is off to a good start. We cordially invite you to submit *your* favorite original or public domain programs, pictures and music to share with the CoCo Community. And, please feel free to speak up and share *your* thoughts about products you buy or reviews you read.

— Marty
(MARTYGOODMAN)
Delphi CoCo SIG Database Manager



For greater convenience, order a RAINBOW Gift Subscription through the shopping area of the CoCo SIG of Delphi!

HOW DO YOU SHARE A RAINBOW?

It's simple —
Give a RAINBOW gift certificate . . .

Share THE RAINBOW with your friends a gift subscription to the premier information source for the Color Computer. Then, each month, all year-round, they'll enjoy the spectrum of RAINBOW programs, articles and information written exclusively for their CoCo!

First, they'll receive a handsome card announcing your gift. Then, they'll be reminded of you each month when they receive up to 300 pages of THE RAINBOW — including as many as 24 programs, 15 regular columns and up to 20 product reviews.

When you give a RAINBOW gift certificate, you'll also be safeguarding your own collection. No more frantic searching for those back issues you've lent to a friend.

Give a RAINBOW gift certificate and let your friends in on something you already know — THE RAINBOW is the perfect companion for the Color Computer!

Please begin a one-year (12 issues) gift subscription to THE RAINBOW for:

Name ____________________
Address ____________________
City ____________ State ________ ZIP ________

From:

Name ____________________
Address ____________________
City ____________ State ________ ZIP ________

☐ My payment is enclosed
Bill to: ☐ VISA ☐ MasterCard ☐ American Express
My account # ____________ Exp. date ________
Signature ____________________

Mail to:

Rainbow Gift Certificate, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

To order by phone (*credit card orders only*) call 1-800-847-0309, 8 a.m. to 5 p.m. EST. For other inquiries call 1-502-228-4492.

Subscriptions to THE RAINBOW are $31 in the United States; U.S. $38 in Canada. The surface rate to other countries is U.S. $68; the air rate, U.S. $103. Kentucky residents add 5% sales tax. **U.S. currency *only*, please.** All subscriptions begin with the current issue. Please allow 6 to 8 weeks for delivery. In order to hold down non-editorial costs, we do not bill.

Now from Falsoft, The RAINBOW MAKER, comes . . .

The monthly magazine that's reader-friendly

If you're interested in the highly popular Model 100, the Tandy 200, the brand new portable Tandy 600 or Tandy's new generation of MS-DOS computers — the 1000, 1200, 2000, or the exciting new Tandy 3000 — PCM is for you!

PCM, The Personal Computer Magazine for Tandy Computer Users, is brought to you by the same people who bring you THE RAINBOW, the premier magazine for the Color Computer. Need we say more?

So, if you're ready to add portability or step up to MS-DOS, stay with Tandy and THE RAINBOW family by subscribing to PCM!

FREE PROGRAMS!

We learned from THE RAINBOW that readers want programs to type in, so each month we bring you an assortment of them, including games, utilities, business applications and graphics.

BAR CODE, TOO!

Also, PCM is the only computer publication in the world (that we know of) that brings you programs in bar code, ready to scan into memory with the sweep of a wand!

TUTORIALS GALORE

Add to this our regular tutorials on telecommunicating, hardware and machine language, as well as BASIC programming tips and product reviews, and we think you'll find we're one of the most informative and fun magazines on the market today.

So if you're ready to add portability or step up to MS-DOS, stay with Tandy and THE RAINBOW family through PCM.

To order by phone (*credit card orders only*) call 1-800-847-0309, 8 a.m. to 5 p.m. EST. For other inquiries call 1-502-228-4492.

☐ YES! Please send me a one year (12 issues) subscription to PCM for only $28.* A savings of 22% off the newsstand price.

For greater convenience, order a PCM Subscription through the shopping area of the CoCo SIG of Delphi!

Name ______________________________

Address ______________________________

City ____________________ State __________ ZIP ________

In order to hold down costs, we do not bill.

☐ My check in the amount of __________ is enclosed.

Charge to my: ☐ VISA ☐ MasterCard ☐ American Express

Acct. # ______________________________ Expiration Date __________

Signature ______________________________

*Canadian subscribers add U.S. $7. Surface rate elsewhere $64, airmail $85. Allow 6 to 8 weeks for first copy. Kentucky residents add 5% sales tax. **U.S. currency *only*, please.**

Mail to: PCM, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

TURN OF THE SCREW

Investigating the CPU

By Tony DiStefano
Rainbow Contributing Editor

If you have been following the past several articles, you are familiar with how a memory chip works. A memory chip by itself is not useful and a Printed Circuit Board (PCB) full of memory chips cannot do much. We need something that can write to and read from this memory. What we need is a CPU. What is a CPU? It's a Central Processing Unit.

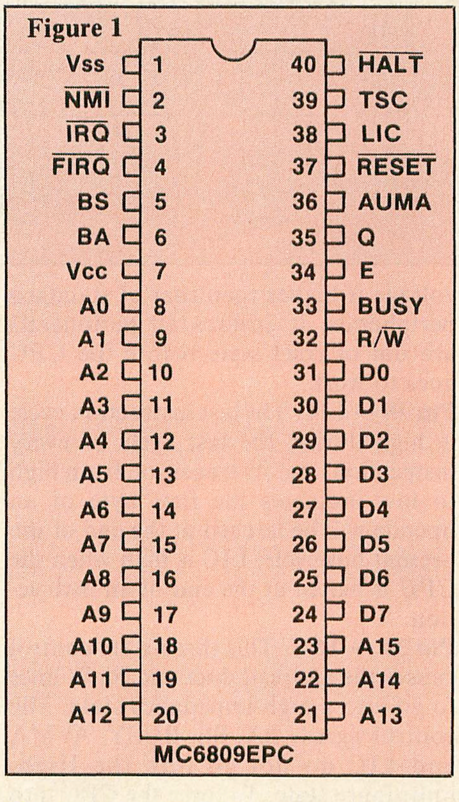
This chip is the workhorse of the computer. It does just about everything. In the CoCo, the CPU is made by Motorola. The part number for this chip is MC6809EPC. The "MC" stands for the company, the "6809" is the part number, the 'E' means it's driven by an external clock and the "PC" means it is a plastic package.

It's common knowledge that the 6809 is one of the most powerful eight-bit CPUs made. In fact, some people argue it is *the* most powerful. Whatever the case, we're going to dig into it and look at it from a hardware point of view.

The most important thing to know about this chip is the pinout. The 6809 is contained in a 40-pin DIP (Dual Inline Package) the same size and shape as the VDG, PIA and SAM chips also in the CoCo. Figure 1 shows this 40-pin chip and the pin names. The following is a pin-by-pin description of the 6809.

Tony DiStefano is well-known as an early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

Figure 1



Pin 1 — Vss. This is the ground pin to which all signals are referenced. It has a potential of zero volts.

Pin 2 —$\overline{\text{NMI}}$. This normally high (five volts or logic state of one) input triggers on the negative edge of a pulse. This in turn requests that a non-maskable interrupt sequence be generated. A non-maskable interrupt (as the word indicates) cannot be inhibited by the program. It also has a higher priority than $\overline{\text{FIRQ}}$, $\overline{\text{IRQ}}$ or software interrupts.

During recognition of this $\overline{\text{NMI}}$, the entire machine state is saved on the hardware stack. After a reset, an $\overline{\text{NMI}}$ is not recognized until the first program load of the hardware stack pointer. The pulse width of the $\overline{\text{NMI}}$ low must be at least one E-cycle long before it is recognized.

Pin 3 — $\overline{\text{IRQ}}$. This input triggers in the same way as the $\overline{\text{NMI}}$ except it initiates an interrupt request, providing the $\overline{\text{IRQ}}$ bit in the CC (Condition Code register) is clear. This also saves the entire machine state on the stack. The $\overline{\text{IRQ}}$ has a lower priority than the $\overline{\text{FIRQ}}$. It is up to the service routine to clear the source of the interrupt before doing an RTI (Return from Interrupt).

Pin 4 — $\overline{\text{FIRQ}}$. This input, like the $\overline{\text{IRQ}}$, initiates a fast interrupt request, providing the $\overline{\text{FIRQ}}$ bit in the CC is clear. This has higher priority than the $\overline{\text{IRQ}}$, but only saves the CC register and the program counter on the stack. The interrupt service routine should clear the source of the interrupt before doing an RTI.

Pins 5 and 6 — BS (Bus Status) and BA (Bus Available). Two outputs that work together to generate the condition of the CPU. When BS and BA are both low, a normal or running condition exists. When BS and BA are both high, it indicates the CPU is in the halt mode. When BS is high and BA is low, an interrupt or reset is acknowledged. And finally, when BS is low and BA is high, the CPU is in a sync acknowledge mode.

Pin 7 — Vcc. This input powers the CPU with five volts.

Pin 8 to 23 — A0 to A15. These 16 pins are used to generate one of 65,535 different address locations the 6809 CPU can access for data transfer. When the processor does not require the bus for a data transfer, it sends out all that is on the address bus. The R/W line equals one, but BS equals zero. This is known as a dummy access or VMA cycle. All addressed bus lines go into a high-impedance state when BA is high or when TSC is driven high.

Pin 24 to 31 — D7 to D0. These eight bi-directional pins are used to transfer data to and from the CPU and other devices connected on the data bus.

Pin 32 — R/$\overline{W}$. This output signal indicates the direction of the data transfer on the data bus. A low indicates the CPU is writing data to the data bus. A high means the CPU is reading. When BA is high or when TSC is high, the output is made high-impedance.

Pin 33 — BUSY. This output-pin signal indicates that bus re-arbitration should be deferred. Wow, what a mouthful! This means BUSY is high for the first two cycles of any instruction that first reads, then writes new data, high during the first byte of a double-byte access, and during the first byte of any indirect access.

Pin 34 and 35 — E and Q. These clock signals are required only by a 6809 that has an 'E' prefix. In the CoCo, these signals are generated by the SAM (MC6883) chip. These signals bring the CPU to life. The 'Q' clock must lead the 'E' clock. Addresses are valid after the falling edge of the 'E' clock, and data is latched from the bus by the falling edge of the 'E' clock. More on 'E' and 'Q' clocks later.

Pin 36 — AVMA. This output is the advanced VMA signal and indicates the CPU will use the bus in the following bus cycle. The predictive nature of the AVMA signal allows efficient shared-bus multiprocessor systems. When the CPU is in either a halt or sync state, the AVMA is low. The CoCo does not support this feature.

Pin 37 — $\overline{\text{RESET}}$. A low on this normally high input forces the CPU into a reset condition. The reset vectors are loaded into the program counter from locations $FFFE and $FFFF, then the CPU begins to execute the instructions it finds. Because the reset threshold voltage is higher than that of standard peripherals, it ensures all peripherals are out of reset state before the CPU goes to work.

Pin 38 — LIC. The last instruction cycle is high during the last cycle of every instruction, and its transition from high to low indicates the first byte of an opcode will be latched at the end of the present bus cycle. LIC is high when the CPU is halted at the end of an instruction.

Pin 39 — TSC. This three-state control causes the address, data and R/W lines to go into a high-impedance state. The control signals BA, BS, BUSY, AVMA and LIC do not go into the High-impedance state. To force the CPU into this state, TSC must be made high just before the end of the previous cycle. To regain access, TSC is brought low and the clocks for that processor restarted when the addresses become valid.

Pin 40 — $\overline{\text{HALT}}$. A low level on this input pin causes the CPU to stop running at the end of the present instruction and remain indefinitely without loss of data. When halted, the BA output becomes high, indicating the buses are free. While stopped, the CPU does not respond to external requests, although $\overline{\text{NMI}}$ or $\overline{\text{RESET}}$ will be latched for later response. During the halt state the 'Q' and 'E' clocks must continue to run normally.

Figure 2

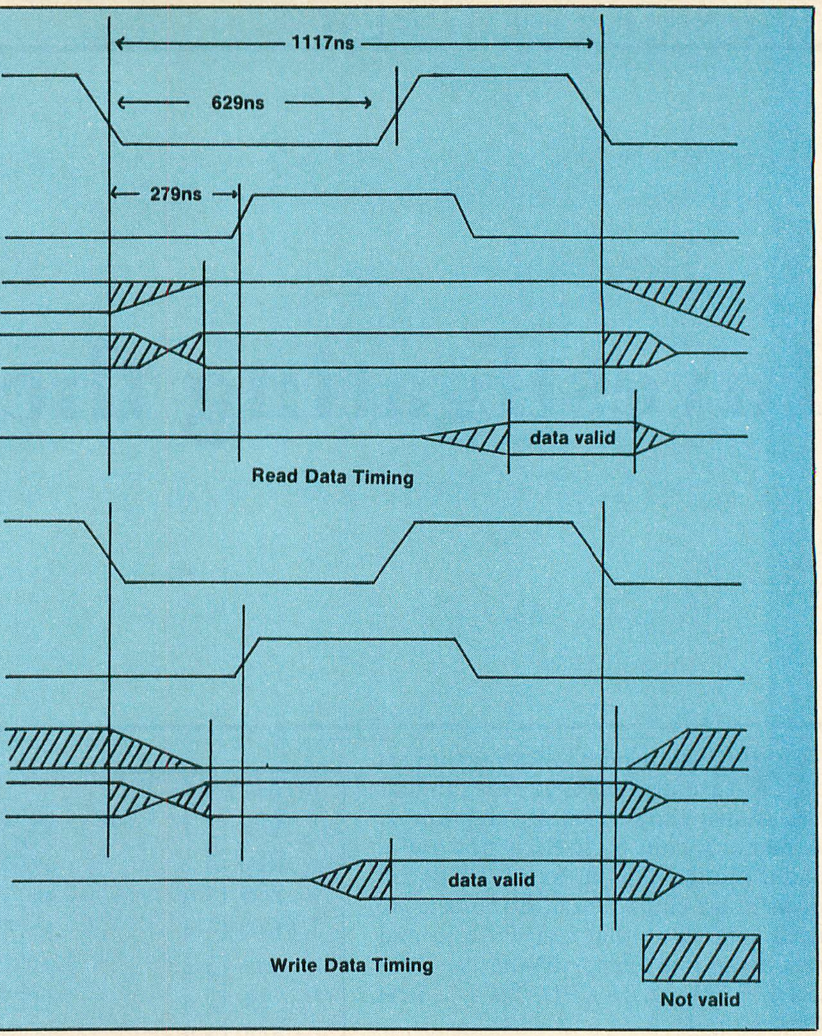


Figure 2 is a diagram of the timing information of a read cycle and write cycle for memory or peripherals.

The complete read cycle for the CoCo is about 1,117 ns (nanoseconds) long. The cycle starts with the falling edge of the 'E' clock. Some 200 or so nanoseconds later, the address bus is stable. That means the bus holds a valid 16-bit address. At the same time, the R/$\overline{W}$ line is stable with a logic level of one. A little later, about 80 ns or so, the 'Q' clock changes to a high condition. But for now, it is not very important.

The next change is the 'E' clock. About 629 ns after the 'E' clock falls, it rises again. This change is important but I'll get to that later. Next, the 'Q' clock falls to a zero state. Now, most important, when the falling edge of the 'E' clock occurs, the data on the data bus is transferred into the CPU.

There is a small catch: the data must have been valid (stable and not changing) 80 ns before the falling edge of the 'E' clock. It is up to the memory device or peripheral to make sure the data is there on time. The CPU does not wait; if the data is not there on time, wrong data is entered into the CPU.

The second part of Figure 2 is a write cycle. The complete write cycle is the same length as the read cycle, approximately 1,117 nanoseconds. Again, everything starts with the falling edge of the 'E' clock, and again the address bus is stable with a 16-bit address. This time the R/W line is stable with a logic level of zero. The 'Q' clock rises and the 'E' clock rises; the 'Q' clock falls and the 'E' clock falls. But this time, the CPU supplies the data.

The data is valid no later than 200 ns after the rising edge of the 'Q' clock, which occurs just before the rising of the 'E' clock. The data stays valid until about 20 ns after the falling edge of the 'E' clock. In that time, the memory of the peripheral device must take the data from the data bus. Then another cycle starts. The CPU decides whether it is a read or a write, depending on what it's doing next.

How the CPU decides depends on what it did in the previous cycle. When the computer is first turned on, the reset line keeps it from doing anything until everything stablizes. When the reset line starts the CPU going, it always does the same thing — two reads. These two reads are always at the same place, $FFFE and $FFFF. This is the reset vector, which is a pointer that points to a memory location. Because the 6809 can access 65,535 bytes of data (16 bits), the pointer must be exactly 16 bits long. Since the 6809 can access only eight bits at a time, the pointer must be two bytes long.

After the CPU reads these two bytes, it places them in an internal register called the program counter. This program counter always points to the CPU's next instruction. The CPU reads the first instruction. Instructions in the 6809 can be one to four bytes long, so the CPU has to read zero to three bytes more depending on the instruction. After the complete instruction has been read, the CPU acts on it. This instruction could be read data, write data or do something internal. Whatever the case, the CPU continues to read and write until turned off.

Now we know how a CPU accesses devices on the bus. It's time to join the CPU and the memory chips discussed in previous articles.

For example, let's use an 8K memory device. This could be a ROM or a RAM chip. It has 13 address lines, A0 to A12. Two to the power of 13 is 8K. Since the CPU can access 64K, eight of these memory chips can be used. But how? Some sort of decoding has to be set up. If we hook up the first 13 address lines to the CPU, we are left with three unused lines.

Now, we can use a three to eight decoder chip (explained in an earlier article). If we connect the three unused address lines of the CPU to this decoder, we have eight individual address locations. In turn, these eight lines can be used to control the chip enable lines of eight 8K memory devices. That brings our total to 64K of memory. Mixing the 8K devices between ROM and RAM would give us a complete computer. Well, almost.

Eight chips of memory do not a computer make. It needs a little more than that. Things like a keyboard, video, drives and joysticks are a must on a computer. These connect a computer to the real world. But these things are not as complex as you might think. They are just more devices connected to the CPU via address lines, data lines and control lines.

For instance, the keyboard is simply a bunch of switches and, through a device called a PIA (Peripheral Interface Adapter), the CPU monitors the switches and interprets them according to the software. Each switch represents a letter of the alphabet or a number. That's all. PIAs and other I/O devices take up little room in a memory map. A PIA only takes up four bytes. More decoder chips are needed in order to map it properly, but the same theory is used.

PRINTERS!!!

NEW! Star Micronics NX-10	$295
Okidata 192 (Parallel)	$370
Okidata 192 (Serial)	$425
Okidata 182	$240
Silver Reed 550 (Daisy Wheel)	$395
Silver Reed 400 (Daisy Wheel)(Par. or Serial)	$200

Other Printers, Monitors, and Accessories for CoCo and IBM upon request.
$15 off interface with purchase of printer.
Find your cheapest published price and we'll beat it!!!

SP-2 INTERFACE for EPSON PRINTERS:

- 300-19,200 BAUD rates
- Fits inside printer — No AC Plugs
- Optional external switch ($5.00 extra) frees parallel port for use with other computers
- $49.95 (plus $3.00 shipping)

SP-3 INTERFACE for MOST OTHER PRINTERS:

- 300-19,200 BAUD rates
- External to printer — No AC Plugs
- Built in modem/printer switch—no need for Y-cables or plugging/unplugging cables
- $64.95 (plus $3.00 shipping)

Both also available for IBM, RS-232 and Apple IIC computers.

DISK DRIVE SYSTEMS

ALL ½ HEIGHT DOUBLE SIDED

Drive 0 (addressed as 2 drives!)	$235
Drive 0,1 (addressed as 4 drives!)	$350

All above complete with HDS controller, cable, & drive in case with power supply

Bare Double Sided Drives	$109
Dual ½ Height Case w/Power Supply	$49
Double Sided Adapter	$25
HDS Controller, RS ROM & Instructions	$99
25 CDC DS/DD Diskettes	$32 & $3 s/h

We use the HDS controller exclusively. Can use 2 different DOS ROM's.
Shipping Costs: $5/drive or power supply, $10 max.
Co Co Serial Cables 15 ft.—$10. Co Co/RS-232 Cables 15 ft.—$20.
Other cables on request. (Add $3.00 shipping)

CNR ENGINEERING
P.O. Box 293
Raritan, NJ 08869
(201) 722-1055

PIPELINE

SIX SHOOTER Tactical Electronics Corporation now offers an automatic parallel interface printer switch that lets up to six computers share one printer. It supports computers using a Centronics-type parallel port. The switch, which is available for under $500, is invisible to applications, allowing use with word processors and graphics screen dumps. Each connected computer is prioritized. If a shared printer is in use, the switch appears to be an offline printer to the computer. Switching is automatic and there is no data loss during switchover. Also, an automatic line feed can be provided for computers if necessary. *Contact Tactical Electronics Corporation, P.O. Box 1743, Melbourne, FL 32902, (305) 676-6907.*

* * *

EDUCATED CABLE The new User Programmable Interface Cable presents a solution to RS-232 asynchronous interface problems. The user may select, via DIP switches on the male-to-male cable, configurations covering 95 percent of applications. The DB25 cable is priced at $19.95 and is available in a 10 foot length. *Contact Craig Data Cable Co., 652 Glenbrook Road, Stamford, CT 06906, (800) 243-5760 (in Connecticut call 203-356-9315).*

* * *

BBS DREAM A new BBS package is under development for the CoCo by Software Interphase, Inc. The *SysLink* system is to support TeleLink Networking for private and public messages; *MicroMatch* for online computer dating; *FileMail* for sending private files to other users; *SuperVote* for surveys and polls; and much more. Also provided with the package will be manuals the SysOp may sell to system users. *Contact Software Interphase, Inc., 5 Bradley Street, Providence, RI 02908, (401) 274-LINK (voice) or (401) 272-1138 (300/1200 Baud).*

* * *

TWO-PORT BUFFER Proteus, a parallel two-port buffer that supports hardware or software switching of ports, is now available from Computer Friends. Proteus features multiple-copy capability on each port as well as flexible capacity buffering. This means each port is given as much memory as available. Cost is $199 for the 64K version and $299 for the 256K version. *Contact Computer Friends, Inc., 6415 SW Canyon Ct., Portland, OR 97221, (503) 297-2321.*

* * *

FREE OFFER Falcon Safety Products, Inc. has announced the availability of a free 16-page illustrated guide on preventive maintenance techniques for computers and other electronic office equipment. The booklet guides the reader through proper maintenance using products from the Falcon line of care products. Topics covered include dust removal, static control, platen restoration and safety measures. *Contact Falcon Safety Products, Inc., 1065 Bristol Road, Mountainside, NJ 07092.*

* * *

PUBLIC DOMAIN CompuServe has placed specifications for the asynchronous 'B' protocol file transfer program into the public domain. Protocol features include interrogation of remote computer characteristics such as transfer capabilities, cursor addressing and graphics modes, as well as host initiation of file transfers in either direction. The specification documents and C language sources for the generic implementation can be downloaded free of charge from the CompuServe Information Service.

* * *

PROTECTION Reuters News Service has reported that radiation emitted from computer monitors and televisions may be harmful. To combat the effects of the offending rays, RAM has introduced CRT Shields. Priced from $29.95, these shields are manufactured with lead and chemically treated to filter out harmful radiation. The non-glare shields also include a lifetime warranty. *Contact RAM, 8306 Wilshire Blvd., Suite 10, Beverly Hills, CA 90211, (800) 227-2001 (in California call 800-537-2001).*

* * *

BOOKWORM Howard W. Sams & Co. has recently introduced *Computerfacts* technical service data manuals for seven Tandy/Radio Shack products. These manuals provide the repair data necessary for service and maintenance of computer equipment. Included in the manuals are schematics, wave form photos, trouble-shooting tips and replacement parts lists. Priced from $19.95, the manuals are available for, among other Tandy products, the CoCo and CoCo 2 as well as the DMP-110 printer. *Contact Howard W. Sams & Co., 4300 W. 62nd Street, Indianapolis, IN 46268, (317) 298-5400.*

* * *

ALSO . . . Howard W. Sams & Co. has released *68000, 68010, 68020 Primer* — a book written to introduce novice or experienced programmers to the instruction set and addressing modes of the 68000 family. The book covers architecture of the chips, how to program in assembly language, code-mapping and how the chips are used in multi-user systems. For more information write to the address given above.

* * *

COVER UP Mousetop, the mouse cover with a "country look," has set out to give personality to computer "mice" nationwide. This cover fits most computers' mouse devices. Made from silver/gray fur, Mousetop comes in two varieties. One is slightly near-sighted and wears wire-rimmed "granny" glasses, and the other has 20/20 vision. The washable Mousetop is designed to protect your mouse from the grime of daily use. It retails at $5.95 with glasses and $5.49 with 20/20 vision. *Contact H&H Enterprises, Box 2672, Corona, CA 91718, (714) 737-1376.*

256K SUPER RAM 512K

HOME RUN!

➸ 256K Bd - $129.95
➸ 512K Bd - $169.95

(Requires RS Multi-Pak)

OS-9 DRIVER $24.95

The first 256K/512K memory bd for the CoCo II ! Inside this low noise metal case lives 256K/512K of memory and all the circuitry to access it as a RAMDISK ! Compatible w/all CoCo II's even 26-3127 & 26-3134A/B (see June '86 Rainbow Review)

256K THUNDER RAM 256K

STRIKE 1 - RAM!

(NOT available for CoCo II's)

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

Thunder Dupe 2 - Format & Backup a FULL diskette (68 grans) in ONE PASS! Up to 4 Disk Drives!!! $24.95

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

OS-9 DRIVER $24.95

The first 256K memory Bd for the CoCo! Load four 32K pgms at once, emulate a 40trk RAMDISK, 60K Print Spooler, FAST access, 30+ Hi-Res screens in memory!! $99.95 (see Sept '85 Rainbow Review)

DOUBLE RAM - Upgrades a THUNDER RAM from 256K to 512K giving TWO independent RAM Disks! $79.95

NEW VERSION COCO MAX II NEW VERSION

STRIKE 3 - A HIT!

Feature packed hardware & software Graphics System! Includes: Pull-Down Menus, Icon processing, multiple Font styles, full graphic editing plus a special Input Module for 256x192 joystick input.

64K DISK $79.95 w/Y-Cable $99.95

Requires Multi-Pak or Y-Cable ($29.95)

CoCo Max I - II Disk Upgrade - $19.95

CoCo Max (TAPE) $69.95 Mouse Pad $14.95

10 MEG SUPER DISK 20 MEG

GRAND SLAM!

☆☆☆☆☆☆☆☆☆☆

Tony Di Stefano (Turn of the Screw Guru) has done it again ! ! ! Coming soon is SUPER DISK - a HARD DRIVE adapter that will fit inside the Super Controller or Super Ram. It will be able to access one or two FIVE, TEN or TWENTY MEGABYTE Hard Disk Drives. Write for more exciting details !

☆☆☆☆☆☆☆☆☆☆

SUPER CONTROLLER

STRIKE 2 - DOS!

Uses 2764 ($6.95) or 27128 ($14.95) EPROMS !

EPROM Programmer ↓ $59.95 ↓ (Requires Super Controller)

The most AMAZING CoCo Disk Controller ever! Switch up to 4 DOS's (up to 16K) via a single software POKE! Choose between R/S 1.0/1.1, Spectrum DOS, ADOS, JDOS, Stearman DOS - $99.95

Spectrum DOS $29.95 and/or ADOS $39.95 w/purchase of Super Controller (Buy 'em both for $59)

Enhanced Display 80 - Add an 80x24 display, Real Time Clock & Centronics Parallel Printer interface to your Super Controller ! Includes SMOOTH SCROLLING & Switchable Video Input !! $129.95

NEW! OS-9 Driver for Display 80 $24.95

SPECTRUM PROJECTS, INC.
PO BOX 21272
93-15 86TH DRIVE
WOODHAVEN NY 11421
Shipping $3.00 (Foreign $5.00)
COD $2 extra - NY Res add tax
COD Order Line 718-441-2807

SPECTRUM PROJECTS

SOFT AND HARD WARES FOR COLORFUL COMPUTING

COMMUNICATION

COLORCOM/E - A complete smart terminal package! Upload, Download, Hi-Res (51X24) screen, 300/1200 Baud, Offline Printing. 32/64K Disk* - $39.95
*- Now with DELPHI & Compuserve XMODEM support! Download ML!
COMPUSERVE 5hr Start Kit $29.95

SAVE $20 ! Get CC/E TW-64 TELEPATCH for only $99.95

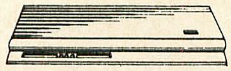
WORD PROCESSING

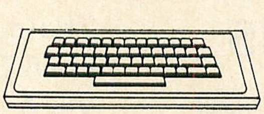
TELEWRITER-64 - Three Hi-Res screens, true lowercase char's right justify, full screen editor. Tape $49.95 Disk $59.95
TELEPATCH - A TW-64 enhancer!!! True block move, Overstrike & TSPOOL mode, Type Ahead Buffer FASTER Disk I/O 64K Disk $19.95

BUY BOTH → SAVE $10

MODEMS

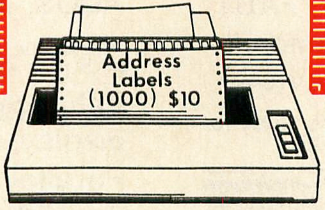
MODEM - 300 Baud - $59.95**
UNITECH Modem Phone - $79.95**
J-CAT Modem - Lowest priced auto/answer modem - $119.95
HAYES SM300 - "Programmable" auto-dial/auto answer-$169.95**
Hayes"CLONE"1200 Baud-$199.95**
** - Add $12.95 for Modem Cable





PRINTERS

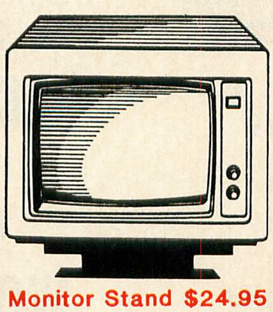
GEMINI 10X - closeout $179.95
GEMINI SG-10 - 120 cps w/true descenders, 2K buffer, tract-frict feed, NLQ mode! - $239.95
BriteFace-The first INTELLIGENT Parallel Ptr Interface for CoCo Auto set Baud rates from 600 to 9600/NO switches to turn $59.95



Address Labels (1000) $10

KEYBOARDS

HJL-57 - Save $7.00 !! - $72.95
HJL NumberJack Keypad - $79.95
-Specify Model/Revision Board-
CoCo Keybd Software - Finally! An ENHANCED Function Key Pgm! 4 most wanted features: 9600 Baud Poke, Text Screen Dump, Line Listing & Cold Start-DSK $14.95



Monitor Stand $24.95

MONITORS

MONOCHROME Monitors - CRISP 80x24 Hi-Res screens! $79.95
Universal Video Driver - Works w/all monitors & CoCos!- $29.95
Anti-Glare Screen $24.95
13" COLOR Monitors $169.95
TAXAN Tuner-Receive TV channels on any composite monitor $99.95

SAVE $10 OFF COLORCOM/E WITH A HAYES MODEM
OFF TELEWRITER-64 WITH ANY PRINTER, KEYBOARD OR MONITOR **SAVE $10**

COD ORDER HOT LINE - CALL 718-441-2807

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

SPECTRUM PROJECTS

SOFT AND HARD WARES FOR COLORFUL COMPUTING

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

NEW LOW PRICES FOR '86

BUY 'EM BOTH FOR
(DYNACALC & PCF 2.0 ONLY)
$99.95

SPREADSHEET

	Competition	DYNACALC
Screen	32X16	51X24
Precision	9 digits	16 digits
Hi-Res Graphics	NO	YES
Visicalc cmd format	NO	YES

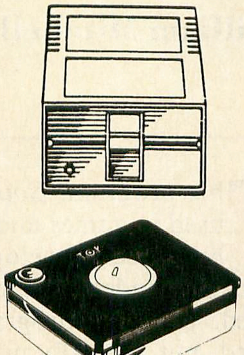
New low price! 64K Disk $69.95
Side Wise -Print DYNACALC files up to 255 chars-sideways! $24.95

DATA BASE MANAGER

PRO-COLOR FILE 2.0 - 60 Data Flds, 8 Report Fmts, 4 Screen Fmts, 1020 bytes/record, Sort 3 Fields, Global Search, FAST ML Sort, Create Files Compatible w/DYNACALC! - Disk $49.95
Pro Color Dir and PCF Forms - Buy 'em both for only $29.95

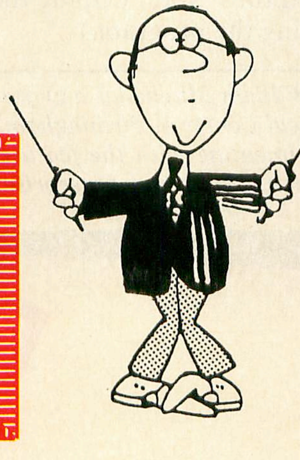
DISK DRIVES

DRIVE 0 System* - SS/DD, 6ms, 40 Tracks, Super C'tlr .$199.95
DRIVE 0 & 1 System* - $299.95
Disk Drive 1, 2 or 3 - $119.95
Power Supply & Case - $59.95
Drive 1 for 26-3129/31 - $99.95
Double Sided Drive 0 * $239.95
* PLUS: controller-manual-cable



GAME CONTROLLERS

Wico Command Adapter - Now you can hookup 2 Atari type joystks to your CoCo for only $19.95!
Wico Trackball-Rapid fire & 360 action! Reg. $69.95 - Now $19.95
DELUXE Joystick - 360 Degree control with center return or analog positioning - $39.95



DISK SOFTWARE**

1. Fast Dupe II $14.95
2. EZ Base (Database) ...$24.95
3. Graphicom $24.95
4. Graphicom Part II $24.95
5. Greeting Cd Designer .$24.95
6. Blackjack Royale $24.95
7. Spect'm Adv Generator $29.95
8. HARDCOPY(Specify PTR) $29.95

COCO II UPGRADES

Want to upgrade your new $69/$88 CoCo II? (See below !!)
4464 DRAMs - two chip 64K upgrade for 26-3134A and 26-3134B Korean CoCo II's ..$39.95
Extended BASIC - 28 pin ROM for 26-3134 A/B CoCo II's ...$34.95
Buy 'em BOTH for only - $69.95

DISK SOFTWARE **

Buy any 2 - Save 10%
Buy any 3 - Save 15%
Buy any 4 - Save 20%

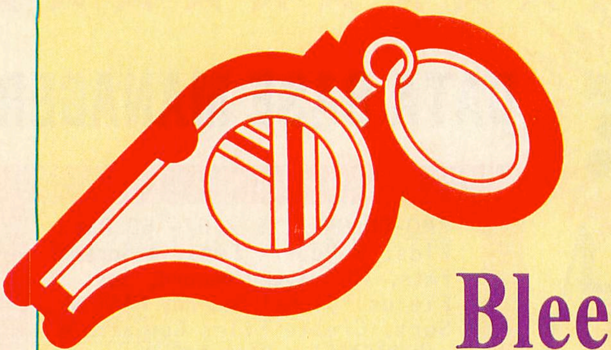
SPECTRUM PROJECTS, Inc.

PO BOX 21272
93-15 86th DRIVE
WOODHAVEN NY 11421

FREE - Send for our CoCo catalog flier !!!
Dealer inquiries invited !
Software submissions welcomed !

All orders plus $3.00 S/H (Foreign $5.00) - COD add $2.00 extra - NYS Residents add Sales Tax

This bundle of subroutines can lend audio effects to any program



Bleeps, Bloops, Bells and Whistles!

By William Mitchell

This program, *Soundbase*, represents an inventory of sounds used in games and educational programs I have written. They have been developed over several months and saved so they can be appended to any program, then called for subroutines as needed. When the program is completed, the unused subroutines are deleted, but I usually use all of them in most programs. *Soundbase* can be used to form a basis for many programs.

(Editor's Note: Unplug the disk controller, if you have one, before loading the program.) ☐

Dr. William Mitchell is a gynecologist trained at the University of Alabama Medical Center in Birmingham. He is a self-taught programmer who enjoys experimenting with the features possible with the 6809 chip. He has four children and lives in Enterprise, Alabama.

A SPECTRUM PROJECTS SHOPPING LIST

SPECIAL 64K RAM CHIPS $19.95

A CHIP OFF THE OLD...

6821 Standard PIA	$9.95
6822 Industrial Grade PIA	$14.95
6847 VDG Chip	$19.95
6809E CPU Chip (NEW LOW PRICE)	$19.95
Basic ROM 1.2 Chip (30% FASTER)	$19.95
68769 (Fits Disk Basic Skt) Eprom.	$19.95
Basic ROM 1.3 (Newest version)	$24.95
Disk ROM 1.1 (New DOS Command)	$29.95
New SAM Chip w/heatsink (74LS785).	$29.95
Ext Basic 1.1 ROM - NEW LOW PRICE.	$29.95
Eprom Eraser - 3 min erasure time.	$49.95
Model 100 8K Upgrade - (SAVE $70).	$49.95
CoCo First Aid Kit - includes 2 PIAs, 6809E & SAM (Be Prepared!!!)	$59.95
64K CoCo II - w/NEW keyboard	$149.95
Eprom Prgmr (2ms speed/2K - 16K).	$149.95
Tandy1000 512K Upgrade-SAVE $350.	$169.95

COCO LIBRARY...

A History of the CoCo / 1980-1986	.$3.95
CoCo Memory Map	$14.95
Basic Programming Tricks Revealed.	$14.95
The FACTS - Inside "guts" of CoCo.	$16.95
500 Pokes, Peeks 'N Execs	$16.95
Basic 09 Tour Guide	$19.95
Assembly Language Programming	$19.95
Color Basic Unraveled	$19.95
Extended Basic Unraveled	$19.95
Disk Basic (1.0/1.1) Unraveled	$19.95
New! CoCo II Service Manual*	$24.95
SECOND Book & Tape of Adventures	.$29.95
Official OS9 Manual Set	$39.95
The Complete Rainbow Guide to OS9.	$19.95
W/Two Disk Package of demo pgms	$49.95
Color/Extended/Disk Basic Unraveled - Complete 3 Book Set - Save $10!	$49.95

MORE GOOD STUFF...

CoCo Light Pen - ~~$24.95~~ Save $5!	$19.95
Computize "Y" Box - More positive connections than a "Y" Cable	$29.95
Super Voice - SC-02 Synthesizer	$79.95
PBJ WORDPAK-RS HiRes 80x24 disply	$99.95
Micro Works DS-69A Digitizer	$149.95
Tandy 1000 2nd Drive (SAVE $40)	.$159.95

* - Specify CoCo II Catalogue Number

All orders plus $3.00 S/H (Foreign $5.00)
COD add $2.00 extra
NYS Residents add Sales Tax

COCO CABLES AND...

Printer/Modem 15' Extender Cable	.$14.95
Tired of unplugging devices from your RS232 port? Try a RS232 "Y" Cable.	$19.95
Disk Drive Cable (34pin - 34pin)	.$19.95
Modem Cable - 6ft (DB25-DB25)	$19.95
Joystick/Mouse 10' Ext Cable	$19.95
Dual Disk Drive Cable (3-34pin)	$24.95
Null Modem Cable - 4 pin to DB25	.$24.95
Disk Interface/Rom Pak Extender - Move your disks/ROM Paks further away	.$24.95
40 Pin Dual "Y" Cable - Hook up a Disk w/Voice, Word Pak, CoCo Max, etc	$29.95
Triple RS232 Switcher - Now select one of any three RS232 peripherals	$39.95
40 Pin Triple "Y" Cable - Hook up any 3- Voice/Word/RS232/Digitizer PAKs	$39.95
Finally! RS Multi-Pak Extender	$39.95

OTHER GOOD STUFF...

C-10 tapes in any quantity	49 cents
5 1/4" Diskettes, any quantity	.99 cents
OS-9 Quick Reference Guide	$3.95
6809E Quick Reference Guide	$3.95
32K, 64K or 128K RAM Button	$4.99
Blank Amdek 3" Disks	$4.99
Rompak w/Blank PC Brd-27xx series	.$9.95
CoCo Keybd Adapter - Convert 26-3016 & 277-1019 keybds to D/E CoCo's!	$14.95
Video Clear - This cable will reduce TV interference created by CoCo!	$19.95
The Magic Box - Load Mod I/III Basic program tapes into the CoCo	$24.95
DOS Switcher - Select from any two DOSs (Disk 1.0 1.1, JDOS) in J&M ctlr	.$24.95
256K RAM Chips (Set of 8)	$39.95
EARS-CoCo's first Voice Recognition unit w/95% accuracy & 64 Voice Prints!	$99.95
Master Key II w/Ext Cable	$109.95
Amdek Twin 3" Drvs w/controller	.$249.95

SPECTRUM PROJECTS
PO BOX 21272
93-15 86TH DRIVE
WOODHAVEN NY 11421
COD ORDER HOT LINE
718-441-2807

⊕⊕⊕ COLORFUL UTILITIES ⊕⊕⊕

COCO CHECKER ✻

Something possibly wrong with your CoCo??? CoCo CHECKER is the answer!! Will test your ROMs, RAMs, Disk Drives & Controller, Printer, Keyboard, Cassette, Joysticks, Sound, PIAs, VDG, Internal Clock Speed, Multi-Pak Interface and more!! 16K TAPE/DISK **$19.95** (see Jan '85 Rainbow Review)

MULTI-PAK CRAK

Save ROMPAKs to your 64K Disk system using the RS Multi-Pak Interface. Eliminate constant plugging in of ROMPAKs now by keeping all your PAK software on disk. Includes POKEs for "PROBLEM" ROMPAKs- including the NEW 16K PAKS! (Demon Attack,Dragons Lair,etc) 64K DISK **$24.95**

NEW!

TELEPATCH II

All the FEATURES of TELEPATCH plus the classically proportioned characters of the WIZARD ($19.95) font w/TRUE lowercase descenders! Get BOTH & SUPERCHARGE your TW-64 for only **$29.95**

SPIT ´N IMAGE

A super upgrade from Disk Omni Clone! Back everything up! This amazing program handles "non standard" disks with ease. We haven't found any disk yet that it can't handle. Don't ever be caught without a backup again! Lowest price too! Beats most "copy protection" programs! 32K DISK **$29.95**

COCO SCREEN DUMP

The best screen dump program for the Panasonic, Epson & Gemini printers ever! Have the option of standard or reverse images w/regular or double sized proportional pictures. 600-9600 Baud too! A must for Graphicom and CoCo Calendar users. 16K TAPE/DISK **$19.95** (see Nov '84 Rainbow Review)

DISK UTILITY 2.1✻

A multi-featured tool for USER FRIENDLY disk handling. Utilize a directory window to selectively sort, move, rename and kill file entries. Lightning fast Disk I/O for format, copy and backup. Examine contents of files, the Granule Table, plus the size, load addresses and entry points of all programs. Single command execution of both Basic and ML programs. 32K/64K DISK **$24.95** "Disk Utility has proven itself very quickly at my house" - Ed Ellers Oct '84 Rainbow Review pg. 220

NEW!

SPECTRUM FONT GENERATOR

Now you can write files using any CoCo Word Processor (Telewriter-64, VIP Writer, etc.) and convert them to special Highly Detailed character sets! Some of the character sets supported are Italics, Old English, Futuristic and Block. A character set editor is included to create custom sets or modify existing ones! Supports most dot-matrix printers! DISK **$29.95** (see Dec '85 Rainbow Review)

SPECTRUM DOS

Add 24 NEW Disk commands with 2 Hi-Res screens! Supports 40 track & Double-Sided drives, 6 ms stepping, auto disk search, error trapping & "EPROMABLE". 64K DISK ~~$49.95~~ New LOW price!! **$24.95**

SCHEMATIC DRAFTING PROCESSOR

Save time and design pro looking diagrams using a 480X540 pixel worksheet w/6 viewing windows. Over 30 electronic symbols w/10 definable symbols. (Even Logic gates & Multipin chips!) Print hard copy and save to disk. 64K DISK ~~$49.95~~ New LOW price!!! **$29.95** (see Jan '84 Rainbow Review)

NEW!

BASIC+

Basic+ provides ㉓ of the most used BASIC cmds w/one keystroke plus scrolling & editing w/single key! Also included is a 32 character typahead BUFFERED keybd w/auto key & repeat plus a 32K Print Spooler & Ptr Echo!! 64K DISK **$29.95** (see Jan '86 Rainbow Review pg. 192)

COCO CHECKBOOK

Use your CoCo to keep track of your checking and savings accounts! Printout individual personal checks! 32K/64K TAPE **$29.95** DISK **$39.95** (see April'85 pg. 210 & Oct'85 pg. 197 Rainbow Reviews)

✻ NOW AVAILABLE BY EXPRESS ORDER AT YOUR LOCAL RADIO SHACK STORE -

#90-0289 COCO CHECKER - #90-0290 DISK UTILITY 2.1

⇨ **BUY ANY 5 PROGRAMS GET A DRIVE0 FOR $159.95 !✻** ⇦

✻- No other discounts can be applied.

DEMAND TO SEE THE R/S DEMO DISKS ! (FC#0249 & FC#0919)

⌖⌖⌖ COLORFUL UTILITIES ⌖⌖⌖

NEW!

COCO TEXT UTIL

Includes utilities that most CoCo word processors (TW-64, VIP Writer, etc.) leave out! Reset margins to correct length for uploading, convert all UPPER CASE text to mixed upper/lower, display total BYTE count, EASY rename & kill functions! DISK **$19.95** (see May '86 Rainbow Review)

COCO VIDEO TITLER

Start your VCR tapes with dazzling title frames followed by professional countdown to black fade-outs! Use a title page editor with several sizes of text & background colors! 16K TAPE **$19.95**

PENPAL

It's here! CoCo's answer to 1-2-3! PENPAL combines Word Processing, Communications, Graphics, Data Base & Spread-sheet into a single integrated software package! 64K DISK INTRO PRICE **$69.95**

64K DISK UTILITY PACKAGE

Take advantage of an expanded 64K machine. Make an additional 8K of RAM available by relocating the Ext Basic ROM from $8000 to $D800. Copy ROMPAKS to disk (even "protected" PAKS) and create a 32K SPOOL buffer for printing. DISK **$21.95** (see July '83 Rainbow Review)

TAPE/DISK UTILITY

A powerful package that transfers tape to disk and disk to tape automatically. Does an automatic copy of an entire disk of programs to tape. Ideal for Rainbow On Tape to disk. Also copies tape to tape & prints tape & disk directories. TAPE/DISK **$24.95** (see Sept '83 Rainbow Review)

NEW!

SUPER DUPER UTILITIES

Finally! At last! A "SUPER DUPER" utility software package all rolled up into ONE!!! Includes such great utilities as: CoCo Disk Zap, Disk Encryption, Disk Mailing List, EZ Disk Master, Graphics ZOOM, Banner Creator, Function KEYS, Super INPUT/LINEINPUT, Basic Program PACKER, Alpha Directory, Basic SEARCH and much, much more!!! 32K DISK **$29.95** (see June '86 Rainbow Review)

COCO CALENDAR

Get organized for '86 TODAY with the CoCo Calendar! Designed for recording the entire year's occassions and daily appointments so you can plan ahead. You can store HUNDREDS of entries and our GRAPHIC Calendar will show all MEMOS! 32K DISK **$24.95** (see Mar '86 Rainbow Review)

THE OS-9 SOLUTION

NOW, a program that creates a "USER FRIENDLY" environment within OS-9! The OS-9 SOLUTION replaces 19 of the old "USER HOSTILE" commands with single keystroke, menu driven commands. No more typing in complex long pathnames or remembering complicated syntaxes! Set all XMODE parameters at the touch of keys! Requires OS-9 ver.01.01.00 **$39.95** (see Sept '85 Rainbow Review)

COCO-UTIL

NEW!

Now you can have the power to easily transfer Radio Shack Color Computer disk files to your MS-DOS machine - including the Tandy 1000 & IBM PC!!! You can also transfer MS-DOS files to your CoCo disk, even format CoCo disks! CoCo-Util will save you countless hours of retyping! No need to move your computer or printer anymore! Requires 128K MS-DOS computer w/2 disk drives - **$29.95**

NEW!

➳ SOFTWARE BONANZA PACKAGE ➳

Create an instant library of Spectrum Projects TOP Colorful Utility software. Select any of the following 12 programs to customize your own SPECTACULAR SOFTWARE BONANZA! CoCo Checker, Multi-Pak Crak, CoCo Screen Dump, Disk Utility 2.1, Spectrum Font Generator, Tape/Disk Utility, Fast Dupe II, 64K Disk Utility, Spectrum DOS, CoCo Calendar, Schematic Drafting Processor, OS-9 Solution, Graphicom, EZ Base or Blackjack Royale (a $300 plus value) for only **$99.95**!!!

All orders plus $3.00 S/H (Foreign $5.00) – COD add $2.00 extra – NYS Residents add Sales Tax

SPECTRUM PROJECTS
PO BOX 21272 93-15 86TH DR.
WOODHAVEN NY 11421

COD ORDER HOT LINE 718-441-2807

180	68
330	249
450	125
650	193
840	129
END	217

The listing: SOUNDBSE

```
10 '      SOUNDBASE
COPYRIGHT BY WILLIAM L. MITCHELL
             104 CLUBVIEW RD
             ENTERPRISE,AL 36330
             NOV 1985
20 CLEAR 200
30 POKE359,0
40 GOSUB610
50 GOTO650
60 '         SOUND SUBROUTINES
70 '
BUZZER
80 FORV=30TO2STEP-2:PLAY"V31;L25
5;O3;5":NEXTV:RETURN
90 '
DEPTH SOUND
100 PLAY"T2":FOR V=20TO0STEP-5:P
LAY"O4;V"+STR$(V)+";L4;12"
110 FORDL=1TO20:NEXTDL
120 NEXTV
130 FORDL=1TO300:NEXTDL
140 RETURN
150 '
SIREN WARNING
160 PLAY "V30;L200;O4;1;2;3;4;5;
6;7;8;9;10;11;12;O5;1;2;3;4;5;6;
7;L100;8"
170 RETURN
180 '
ZAP OF VOLTAGE
190 PLAY"V20;L255;O1;1;2;3;2;3;4
;3;4;5;4;5;6;5;6;5;4;5;4;3;4;3;2
;3;2;1"
200 RETURN
210 '
HISS OR FIZZ
220 PLAY"L255;O1;V30;1;V5;2;V6;3
;V7;2;V5;3;V4;4;V3;5;V3;4;V4;3;V
6;4;V4;5;V5;6;V4;5;V3;4;V2;5;V3;
6;V2;7;V3;8"
230 RETURN
240 '
BLIPP
250 PLAY"L255;O1;V30;1;V26;2;V22
;3;V18;4;V14;5;V12;6":SOUND 1,1
260 RETURN
270 '
280 '
SPRING
290 PLAY"O2;L255;V15;1;O3;V10;1;
V9;2;V8;3;V7;4;V6;3;V5;4;V4;3;V3
;2;V2;1;V1;1;2;3;2;1;2;3;2;1;2;3
;2;1;2;3;2;1;2;3;2;1;2;3;2;1"
300 RETURN
310 '
TAUNT
320 PLAY "V3;O3;L16;10;10;7;12;L
8;10;7":RETURN
330 '
CHARGE
340 FORX=1TO2
350 PLAY "L4;V4;O4;L16.;1;L32;1;
L16.;1;L32;1;L16.;1;L32;1;L16.;1
;L32;5;L16.;8;L32;5;L16.;8;L32;5
;L16.;8;L32;5"
360 NEXTX:PLAY"1":RETURN
370 '
BIG SPRING
380 FORV=31TO1STEP-1:PLAY"O1;V"+
STR$(V)+";L255;8":NEXTV:RETURN
390 '
BOUNCING BALL
400 PLAY"T2;L255;O1;V31;1;V20;1;
V10;1;P2;V9;1;P5;1;V8;P10;1;V6;P
15;1;V4;P20;1;V2;P25;1;V2;P30;1;
P35;1;P45;1;P60;1;P80;1"
410 RETURN
420 '
SIREN
430 PLAY"T255;L255;O4;V1;1;2;V2;
3;4;;V3;5;6;V4;7;8;V5;9;10;V6;11
;L4;12;L255;V5;10;9;V4;8;7;V3;6;
5;V2;4;3;V1;2;L1;1"
440 FOR DLAY=1TO200:NEXTDLAY:RET
URN
450 '
WOLF WISTLE
460 PLAY"T255;L255;O4;V2;2;V2;2;
V3;3;V4;4;V5;5;V6;6;V7;7;V8;8;V9
;9;V10;10;V11;11;V12;12;O5;V13;1
;V14;2;V15;3;V16;4;V17;5;V18;6"
470 FORDLAY=1TO100:NEXTDLAY:GOSU
B430:RETURN
480 '
MACHINE GUN
490 FORX=1TO6:PLAY"O1;L255;4;3;2
;1":NEXTX:RETURN
500 '
HOORAY FOR THE RED WHITE & BLUE
510 PLAY "O4;V5;L8;C;C;O3;L16;A#
;A;L4;A;V5;L8;G#;A;L2;A":RETURN
520 '
FOR SCREEN DISPLAY
530 KOLOR=RND(7):PATTERN=RND(15)
540 FACTOR=128+(16*KO)+PA
550 FOR T=1TO20
560 PRINT STRING$(32,CHR$(FA));
```

```
570 NEXTT
580 RETURN
590 '
600 'TO GET SCREEN LINES
610 DIMS$(17)
620 FORX=1TO17
630 READ S$(X)
640 NEXT:RETURN
649 '
650 PG=1:SCREEN0,1:GOSUB530:PRIN
T@32,          "           PAGE
   ONE              ";:P=98
660 FORX=1TO8:PRINT@P,S$(X);
670 P=P+33:NEXT
680 PRINT@416,CHR$(255);
720 GOTO790
740 '
750 PG=2:SCREEN0,1:GOSUB530
760 PRINT@32,                  "
          PAGE   TWO           "
;
770 P=99
780 FORX=9TO17:PRINT@P,S$(X);:P=
P+33:NEXT
790 PRINT@416,CHR$(255);
800 INPUTN
810 GOSUB1060
811 IFN=8THEN750
812 IFN=17THEN650
830 ON N GOSUB 80,100,160,190,22
0,250,290,1050,490,320,340,510,3
80,400,430,460,1040
840 IFPG=2THEN750
850 IFPG=1THEN650
855 PRINTPA:PRINTPA:PRINTPA:STOP
860 GOTO750
870 DATA BUZZER---------1
880 DATA DEPTH SOUND----2
890 DATA SIREN WARNING--3
900 DATA BLAST OF LASER-4
910 DATA HISS OR FIZZ---5
920 DATA BLIPP----------6
930 DATA SMALL SPRING---7
940 DATA * SECOND PAGE--8
950 DATA MACHINE GUN----9
960 DATA TAUNT---------10
970 DATA CHARGE--------11
980 DATA HOORAY SONG---12
990 DATA BIG SPRING----13
1000 DATA BOUNCING BALL-14
1010 DATA SIREN---------15
1020 DATA WOLF WHISTLE--16
1030 DATA * FIRST PAGE--17
1040 PG=2:GOTO750
1050 PG=1:GOTO650
1060 SCREEN0,0:RETURN
```

BEST

WE'VE CHOSEN THE BEST OF OVER 450 PROGRAMS AND PACKAGED THEM FOR YOU! 10 TO 12 PROGRAMS EACH PACKAGE. COLOR COMPUTER ONLY.

#1 Home Management I
- Budget
- Checkbook Balancer
- Cost of Living
- Tinycalc
- Electronic Datebook
- Account Manager
- Stock Market
- Word Processor
- Lottery Analyst
- Coco Database
- Coco Terminal
- Bartender

NEW!

#2 Home Management II
- Video Cassette Organizer
- Home Product Evaluation
- Electric, Gas & Water Cost
- Baseball Manager
- Car Manager
- Ham Radio Log
- Home Inventory
- Personal Directory
- Recipe Machine
- Disk Labeler
- Password Scrambler
- Disk Directory Print

#3 Education
- Flash Card
- Spanish Lessons
- Typing Tutor
- Creativity Test
- Arithmetic Football
- Cost of Living
- Math Tutors 1, 2
- Trigonometry Tutor
- Typing Game
- Word Tests
- Talking Alphabet
- Clown Dunk Math

NEW!

#4 Adventures
- Treasures of Barsoom
- Killer Mansion
- College Adventure
- Coco-Terrestrial
- Escape
- Zector
- Skid Row
- Quest
- Naughide
- Haunted House

#5 Games
- Trek
- Galactic Conquest
- Warlords
- The Power Sword
- Steps
- Robot Bomber
- Force Field
- Rat Attack
- Caterpillar Cave
- Meteor

#6 Utilities
- Disk Dir Prot
- Dir. Pack & Sort
- Disk Zapper
- Roll Out
- Doss Boss
- Disk Backup
- 51*24 Editor
- 51*24 Screen
- Autocopy
- Fastsort
- I/O Error Ignorer
- Text Screen Print

Some of these programs above can sell for $29.95 each

VISA

RAINBOW CERTIFICATION SEAL

$29.95 each
TAPE OR DISK
★★ SPECIAL ★★
BUY 2 PACKAGES AND GET THIRD ONE FREE

THE GREATEST SOFTWARE DEAL ON EARTH!

GET 12 DISKS OR TAPES A YEAR CONTAINING OVER 120 QUALITY PROGRAMS. A SUBSCRIPTION TO T & D SOFTWARE CONSISTS OF 10 READY-TO-LOAD PROGRAMS DELIVERED BY FIRST CLASS MAIL EVERY MONTH.

NO, WE ARE NOT THE SAME AS THE RAINBOW ON TAPE. IN FACT, MANY SUBSCRIBERS HAVE WRITTEN IN AND SAID THAT WE ARE MUCH BETTER THAN RAINBOW ON TAPE!

PRICES

	TAPE OR DISK
1 YEAR (12 issues)	70.00
6 MO. (6 issues)	40.00
1 ISSUE	9.00

Michigan Residents Add 4%
Overseas Add $10 to Subscription Price
Personal Checks Welcome!

★ 16k-64k Color Computer
★ Over 3800 Satisfied Customers
★ Back Issues Available From
★ July '82 (Over 450 Programs)

OUR LATEST ISSUE CONTAINED
1. INCOME PROPERTY MANAGEMENT
2. BILL BOARD 2
3. MOUNTAIN BATTLE
4. THE TEN ROUND FIGHT
5. COCO - KEENO
6. HIGH RESOLUTION HOCKEY
7. LOGIC
8. ON SCREEN SCALE
9. LIBERTY SHIP
10. SINGLE STEP RUN

RAINBOW CERTIFICATION SEAL

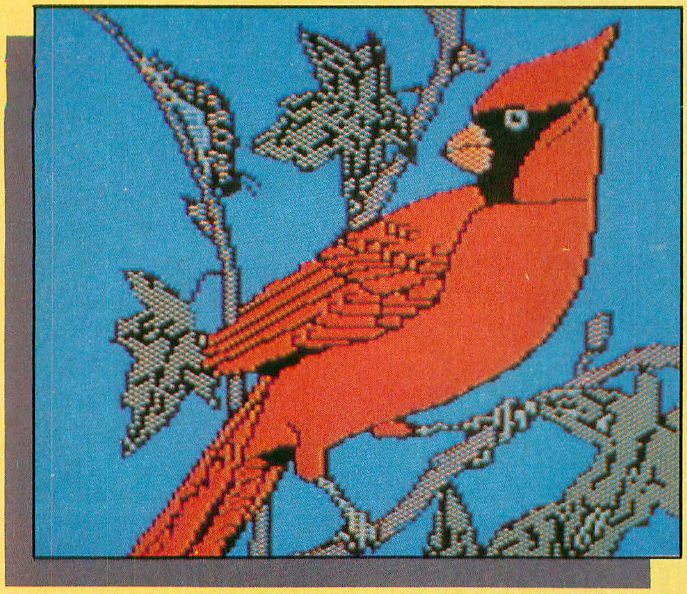
★ THIS MONTH ONLY ★
SUBSCRIBE FOR A YEAR AND RECEIVE A FREE PACKAGE OF YOUR CHOICE. INDICATE WHICH ONE
1. Home Man I
2. Home Man II
3. Education
4. Adventures
5. Games
6. Utilities

GET ISSUE #45 ABOVE FOR ONLY $3.00

MasterCard

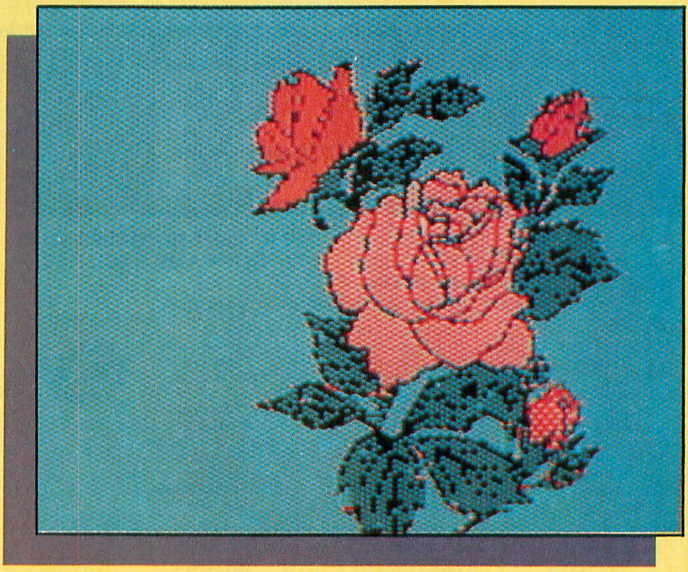
T & D SUBSCRIPTION SOFTWARE, P.O. BOX 256C, HOLLAND, MI 49423 (616) 396-7577

The CoCo Gallery



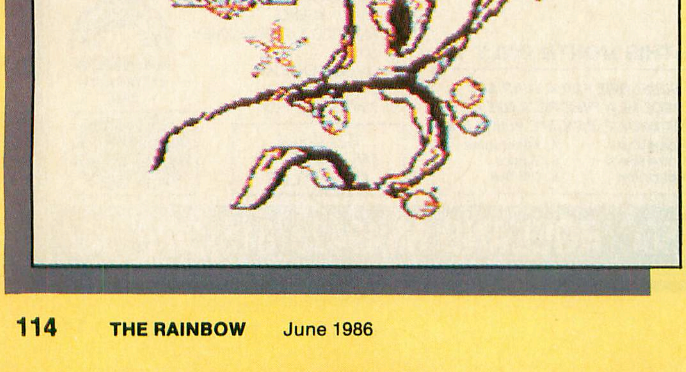
1st PRIZE

Harry McKinion
Cardinal
Our June Gallery opens with a familiar sight of summer, a brilliantly colored songbird heralding the end of winter. Harry lives in Semmes, Alabama and used *X-Pad* to create this picture.



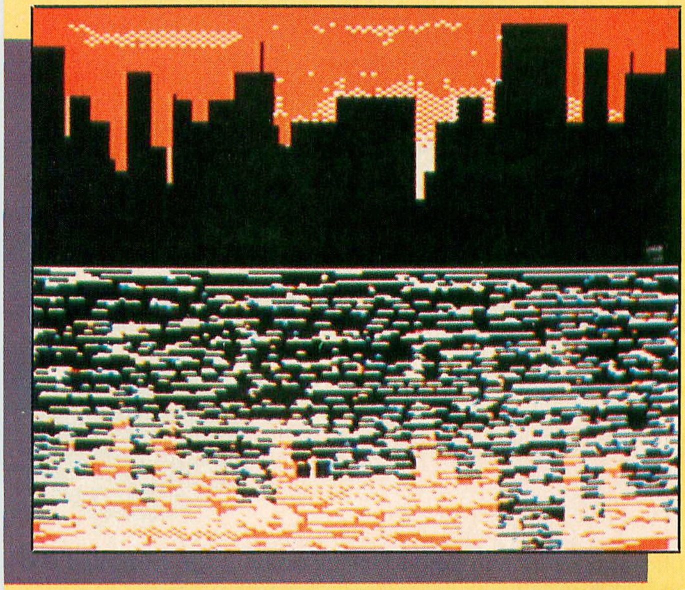
2nd PRIZE

Clay Ambrose
Rose
June is when the roses bloom to their fullest beauty and this skillful rendition of one of nature's lovely embellishments was drawn using *CoCo Paint*. Clay lives in Bloomington, California.



3rd PRIZE

Michael Wafkowski
Scallop 2
Michael lives in Elwood Park, New Jersey and used *CoCo Max* to create a charming arrangement of shells sure to make anyone long for the sea breezes and summer fun at the beach.

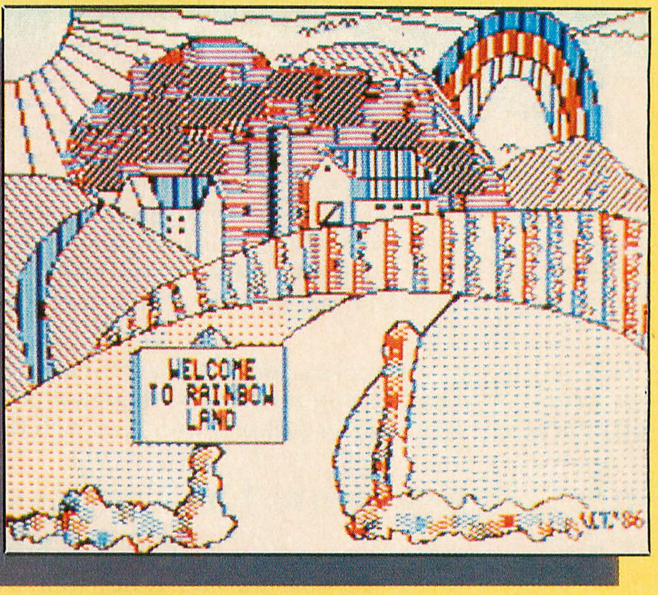


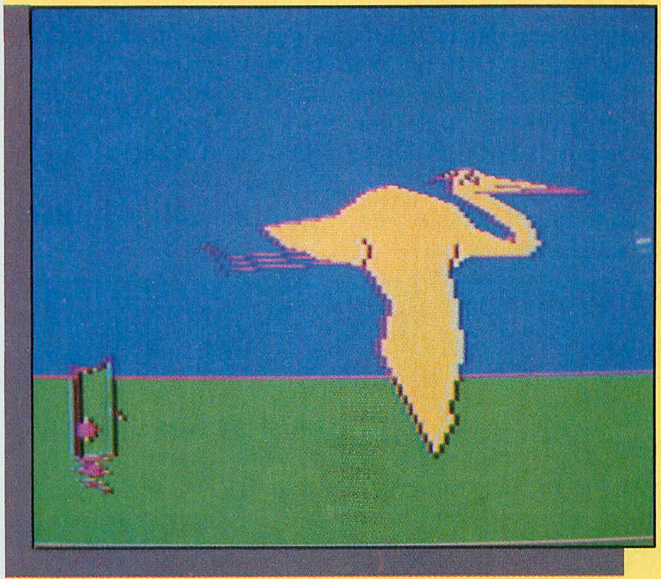
HONORABLE MENTION

Ken Miller
Sunset
Sundown in the city after a hot summer's day is always a welcome sight and apropos in our June Gallery. Ken lives in Yardley, Pennsylvania and used *CoCo Max I & II* for his work.

HONORABLE MENTION

Valerie Torres
Rainbowland
Summer is the season of daydreams and this winsome scene was drawn using BASIC. Valerie lives in Hollywood, California.





HONORABLE MENTION

Merwyn Bly
Egret
Another seaside scene familiar to beach lovers is a lone Egret swooping around looking for the best place to wade. Merwyn lives in Vienna, Virginia and used Extended Color BASIC to draw this picture.

SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community!

Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere.

We will award a first prize of $25, a second prize of $15 and a third prize of $10. Honorable mentions will also be given.

Monica Dorth, Curator

Send your entry on either tape or disk to:
CoCo Gallery
THE RAINBOW
P.O. Box 385
Prospect, KY 40059
Attn: Monica Dorth

Protect Your Valuable Magazine Collection With . . .

RAINBOW
The COLOR COMPUTER MONTHLY MAGAZINE
RAINBOW
CoCo Power!

DISTINCTIVE, DURABLE RAINBOW BINDERS

For greater convenience, order RAINBOW Binders through the shopping area of the CoCo SIG of Delphi!

Each issue of THE RAINBOW is a vital resource that you will refer to again and again, to gain insights, to explore new areas of interest or simply to refresh your memory. So, you need to keep your copies of THE RAINBOW safe — in high-quality, vinyl binders that provide complete protection.

These distinctive red binders not only ensure that your RAINBOWs stay in mint condition, but they showcase your collection as well. Each binder is clearly embossed with the magazine's name in gold lettering on both the front and the spine. They're a handsome addition to any room.

They also make it possible for you to organize your work space and eliminate the clutter on a permanent basis. You'll spend more time on your CoCo and eliminate those frustrating searches for misplaced magazines.

A set of two handsome binders, which hold a full 12 issues of THE RAINBOW, is only $13.50 (please add $2.50 for shipping and handling).

Special Discounts On Past Issues With This Offer

To help you complete your collection of THE RAINBOW, we're offering a special discount on past issues with the purchase of one or more sets of binders.

When you place an order for six or more back issues of THE RAINBOW at the same time you order your binders, you are entitled to $1 off each magazine, which normally sells for the single issue cover price. For an order form, please refer to our "Back Issue Information" page (check Table of Contents under departmental listings). Also with this offer, copies of the "Official And Compleat Index To THE RAINBOW" (a comprehensive index of RAINBOW's first three years, July 1981 through June 1984), usually priced at $2.50, may be purchased for only $1 with a set of binders.

Due to heavy demand, we suggest you order back issues now while supplies last.

______ **YES**. Please send me ________ set(s) of RAINBOW binders at $13.50 per two-binder set (plus $2.50 per set for shipping and handling). If your order is to be sent via U.S. Mail to a post office box or to another country, please add $2. Kentucky residents add 5% sales tax. **U.S. currency *only*, please.**

Order one or more sets of binders and take advantage of these exciting offers:

______ I also want to take advantage of a special savings of $1 off the single issue cover price for back issues with the purchase of a set of binders. (Minimum order of 6 magazines. An order form from a recent issue indicating the back issues you wish to receive should accompany this order.)

______ I want to purchase the first three-year index to THE RAINBOW (July 1981 through June 1984) at the special price of $1 (regular price $2.50) with my purchase of one or more sets of binders.

Name ____________________
Address ____________________
City ____________________ State ________ ZIP ________
☐ My check in the amount of ________ is enclosed. (In order to hold down costs, we do not bill.)
Charge to: ☐ VISA ☐ MasterCard ☐ American Express
Account Number ____________________ Expiration Date ________
Signature ____________________

Mail to: **Rainbow Binders, The Falsoft Building, Prospect, KY 40059.**
To order by phone (*credit card orders only*) call 1-800-847-0309, 8 a.m. to 5 p.m. EST.
For other inquiries call 1-502-228-4492.

WISHING WELL

16K ECB

Learning another valuable Life Skill . . .

A Measure of Success

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget that this is* BASIC. *All programs resulting from your wishes are for your use but remain the property of the author.*

This month's "Wishing Well" offers another Life Skills program designed to help youngsters or students sharpen a skill that is very important for everyday survival. The program, titled *Ruler*, is designed to help individuals master the detailed use of a common ruler (non-metric). Using only the commands available in 16K Color BASIC, we will create a slick program that not only quizzes these skills, but actually helps in the training and memorization required to use them.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

The Wish

Several years ago THE RAINBOW published a program by T. Gray called *Ruler Reader*. It was designed to help quiz the user on reading a ruler and measuring a randomly generated line on the screen. (Mr. Gray's program was based on another program called *King Komputer* by D.B. Allison in the April 1982 issue of *80 Micro* magazine.) The program was a real find for me, since I often spend much time creating from scratch most of the educational programs I need to use with my handicapped and special needs students. The students greatly enjoyed this ruler program.

There was one minor drawback to the program, however. The ruler drawn would only display a measuring stick with divisions down to an eighth of an inch. Since many of my students are involved in a graphic arts program, they are often required to have ruler reading skills down to one-sixteenth of an inch in order to accurately complete their tasks.

I resorted to making work sheets with an enlarged inch broken into 16 parts, all with the correct measurements written below. This proved to be very successful, but many of my fellow instructors lamented the lack of a $^{1}/_{16}$ inch program like the one that THE RAINBOW had provided.

Therefore, the time had finally come to grant a new wish: Create a ruler program that would go down to one-sixteenth of an inch and that would not only quiz, but instruct on the various parts of the displayed inch.

The Program

The concept behind *Ruler Reading Skill* is simple. Using the low resolution graphics of the Color Computer, we create an enlarged view of one inch. I am partial towards using a completely black screen with programs such as this, using `CLS(0)`. Since the inch we draw is with white screen blocks, the black background helps to emphasize the actual divisions on the screen.

Using a set of `FOR/NEXT` loops and the `GET` command, we draw this large inch with subdivisions of $^{1}/_{16}$ displayed. A set of subroutines is also included to label each of these marking lines as needed. This is done using screen `POKE`s so we can have reversed numbers for our fractional markings. This helps keep the consistency of the black screen. (Naturally, these `POKE`s will cause prob-

lems for those who may wish to type this into the MC-10. More on that later.) The overall look of the screen is quite effective.

One very important feature I have included in this program is the rewrite of the INPUT command using INKEY$, which I introduced several months ago. As I mentioned then, the major drawback to the INPUT command is that it reacts to the CLEAR key and thus wipes the screen clean of any work done by the user.

"One of the best features is the review section"

I am sure there are some memory POKEs that disable the CLEAR key, just as there are for the BREAK key. However, there is another major advantage to using this variation of the subroutine mentioned. I have included some IF/THEN statements to have it ignore any useless keys on the keyboard. Since we only want to have our student pressing the numbers and the slash (/) to create our fractions, the letters on the keyboard have been ignored. This prevents the entry of an additional character.

For example, if the answer is ½, the program would mark space ½ as incorrect. The space bar is one of the keys ignored for this reason. All of our possible answers in the quiz section are stored in DATA statements as strings. Therefore, the string "½" and " ½" would not be a match. This way, we avoid needless hassle, especially with some all-thumbs individuals.

Like the original ruler program, the screen gives a random length line that must be matched against the inch displayed. No value markings appear below the lines at this point. I have also taken great care to make the line and the markings on the screen large enough and close enough together so there will be no question as to which marking the line is matching up with.

The user must enter the correct fractional length of an inch using the numbers and the slash mark. The ENTER key must be pressed to record the answer. If the answer is correct, the screen indicates so, and places the marking labels below each inch.

If the answer is incorrect, the screen says: SORRY! TRY AGAIN: and allows another try. On the third try, the screen displays the value markings of each line. At this point, the student should be able to get the correct response. If not, the screen displays the correct answer.

The program may be interrupted at any time by pressing the '@' key and the score is displayed. Continue the quiz part of the program by pressing 'C', rerun the program by pressing 'Y' for yes, or stop by pressing 'N' for no. If you are using this program with students, I would not show them the 'C' (continue) function right away or they will be checking their score after every single problem.

One of the best features of this program is the review section, which appears at the beginning of the program. As you may recall from previous "Wishing Well" articles, I have a special pet gripe against software that claims to be educational but does not teach anything. Many programs just quiz a skill rather than teach it.

The review feature allows the student to walk through the parts of the ruler as many times as needed to be familiar with the material. The student advances through the parts of the ruler by pressing the ENTER key. After the review is complete, the screen reads:

```
DO YOU WANT TO TRY AGAIN (Y/N)?
```

Pressing 'Y' repeats the review while pressing 'N' goes directly to the quiz. You may choose to skip the review part altogether.

MC-10 Changes

I have taken a little different approach this time for the MC-10 changes. If you want to type this in, make the following changes. First, leave out Line 160 and include the following lines in its place:

```
160 X$=INKEY$:MU=(-9999):IFX$
="R"THEN 170
161 IFX$="Q"THEN500
162 GOTO160
```

Next, you must change lines 390-470 to adjust for the POKE variations on the screen locations. After each POKE we need to add MU+.

I have relisted them with the corrections included:

```
390 L=0:FORI=0TO18STEP4:L=L+2:PO
KEMU+1218+I,47+L:NEXT
400 L=0:FORI=21TO31STEP4:L=L+2:P
OKEMU+1216+I,49:POKEMU+1217+I,47
+L:NEXT
410 FORI=0TO31STEP4:POKEMU+1249+
I,45:POKEMU+1250+I,45:NEXT
420 FORI=0TO31STEP4:POKEMU+1281+
I,49:POKEMU+1282+I,54:NEXT:RETUR
N
430 L=0:FORI=0TO31STEP8:L=L+2:PO
KEMU+1316+I,47+L:NEXT
440 FORI=0TO31STEP8:L=L+2:POKEMU
+1348+I,45:NEXT
450 FORI=0TO31STEP8:POKEMU+1380+
I,56:NEXT:RETURN
460 POKEMU+1384,49:POKEMU+1400,5
1:POKEMU+1416,45:POKEMU+1432,45:
POKEMU+1448,52:POKEMU+1464,52:RE
TURN
470 POKEMU+1424,49:POKEMU+1456,4
5:POKEMU+1488,50
```

They are listed here in a 32-column format to help you out. You must add one more line as well:

```
35 MC=15360
```

This helps to ensure the screen POKEs are correct.

Conclusion

The reactions of my students and fellow teachers have been very positive toward this latest Life Skills program. While the inspiration came from other programs, it remains unique in and of itself. I hope you find it useful.

Oops! Correction

Last month I offered a program to create educational plans. I recently uncovered a small quirk that occurs when you scan through all the objectives. The program appears to end if you go all the way to the last objective. This can be solved by including a DATA line reading:

```
4338 DATA "THIS IS THE END OF
THE OBJECTIVES. RETURN TO
THE MENU."
```

This solves the problem by giving you a chance to exit. I hope no one was stymied by this little bug.

Next Month

A surprise for the five-year anniversary issue! ☐

90	77
220	3
410	247
530	106
680	95
END	17

The listing: RULER

```
1 REM****************************
2 REM* LIFE SKILLS INSTRUCTION *
3 REM*  RULER READING SKILLS1  *
4 REM*    BY FRED B. SCERBO    *
5 REM* 60 HARDING AV.N.ADAMS,MA*
6 REM*   COPYRIGHT (C)  1986   *
7 REM****************************
10 CLS0:FORI=1TO32:PRINTCHR$(220
);:NEXT
20 FORI=1TO192:READ A:PRINTCHR$(
A+128);:NEXT
30 DATA29,24,96,29,24,20,30,28,2
6,29,28,29,,,30,28,26,29,,,30,20
,30,20,30,16,20,30,,21,28,29
40 DATA21,,,21,,,26,96,24,21,,20
,16,,26,,24,21,16,22,16,,26,,26,
,16,26,,21,,20
50 DATA21,,,21,,,27,26,96,21,19,
18,,,27,19,18,21,22,16,,,26,,26,
,16,26,,21,19,19
60 DATA85,,,85,,,90,24,,85,,,,,,
,90,85,84,82,,,90,,90,,16,90,,,,
85
70 DATA85,,90,85,,,90,,,85,,81,,
16,90,,90,85,,84,82,,90,,90,85,8
0,90,85,85,80,85
80 DATA87,83,90,87,82,81,91,80,,
87,83,87,,80,91,83,90,87,82,80,9
1,81,91,81,91,87,81,91,87,85,83,
87
90 FORI=1TO32:PRINTCHR$(211);:NE
XT
100 PRINT@324," INSTRUCTIONAL  P
ROGRAM ";
110 PRINT@356,"  RULER READING S
KILLS  ";
120 PRINT@388,"    BY FRED B.SCE
RBO    ";
130 PRINT@420,"   COPYRIGHT (C)
1986   ";
140 PRINT@452,"   (R)EVIEW OR (Q
)UIZ   ";
150 DIMN$(15):FORI=1TO15:READ N$
(I):NEXT:FORI=1TO64:WO$=WO$+CHR$
(128):NEXT
160 X$=INKEY$:MU=(-TIMER):IFX$="
R"THEN170ELSEIFX$="Q"THEN500ELSE
160
170 GOSUB300
180 PRINT@0,"THE LONGEST LINE ON
 OUR INCH IS THE ONE-HALF INCH M
```

Introducing...

Telewriter-64 Character Set Editor

Finally...A utility that allows you to customize the character set to your own specifications! Includes 3 new fonts (one with true descenders!), works with all versions. Written by TELEPATCH author Bob van der Poel.

Tape $14.95 Disk $17.95

TELEWRITER-64 is a trademark of COGNITEC.

New!

Adventure In Mythology
By Scott Cabit

An animated graphics adventure. Battle monsters and discover treasures as you assume the personalities of various heroes in ancient Greek mythology! You goal is to win the hand of the beautiful Atalanta, the swift-running huntress. But beware of the perils and obstacles that stand in your way as you journey through ancient Greece! Four-voice music and sound effects, automatic speech when using a Tandy SSC speech pak. Load and Save feature, over 250 locations. 64K Machine language.

Tape $21.95 Disk $24.95

Fighter Pilot

An original arcade game! Wave after wave of attacking aircraft attempt to shoot you down as you maneuver your fighter into the wild blue yonder, blasting enemy fighter, bombers, and paratroopers out of the sky. Joystick or keyboard operation, "pause game" feature. Disk version saves high scores. 32K, 100% Machine Language. See February '86 Rainbow for review.

Tape $21.95 Disk $24.95

Disk Utility Package

12 great disk utilities in one package! Includes Archive, Backup (35 or 40 track), Format (35 or 40 track...fast!). Find (searches file for a pattern, reports all occurances). Compare (compares two disk files). Occount, and Menu (reads all disks in the system and displays a sorted directory from which to choose). 32K, one disk drive required. See February '86 Rainbow for review.

Disk $19.95

New!

The Andrea CoCo
By Art Martin

Another great animated graphics adventure! All you came down to the Yacht Club for was to get a drink and maybe play a little poker. Heck, nobody would ever guess that the closest thing you owned to a real yacht was the one over your fireplace. It was in the bar that you heard rumors of earth-shattering events about to take place. You step out onto the wharf to get a little air when your natural curiosity and sense of adventure start to work...Can you save the world? Superb graphics, save & load feature. 64K, one disk drive required.

Disk $24.95

Pumpman

You'll dig this 100% ML arcade game! The Pumpman carries a pump that he fires at aliens Pooky and Dragon as they change forms and chase him around underground. 15 different screens, "pause game" feature, bonuses. As fun and challenging as the original arcade game! 32K, one joystick required.

Tape $21.95 Disk $24.95

CGP-220 Screen Dump

A graphics screen dump utility for the CGP-220 Ink Jet Printer. Features include: Fast machine language, four-color and one-color versions, special CoCo Max version, user-selectable colors, regular or double-size printout. 16K.

Tape $14.95 Disk $17.95

Coming Soon...Otto's Oddysey!
64K Graphics Adventure
By Steve Hartford

More Great Software!!!

Eagle Lunar Lander, 32K	$21.95*	**Maycode** 6809 Disassembler, 32K.	$21.95*
Marooned! Graphic Adventure, 32K Disk	$24.95	**Menu Maker** ML Utility, 32K Disk	$19.95
Blackjack Dealer With Feeler Dealer, 32K.	$21.95*	**Hires+** Screen Enhancer, 16K Tape	$19.95
Alpha 40+ Formats 40+ Tracks, 32K Disk	$19.95	**64K Print Spooler** 64K Tape	$9.95

***Add $3.00 For Disk**

Saguaro Software

We've Moved!
4137 E. Bermuda
Tucson, AZ 85712
(602) 881-6786

Add $1.00 For Shipping • C.O.D. Orders Add $3.00
Arizona Residents Add 7% Tax • Dealer Inquiries Invited
Call Or Write For Free Catalog!
Authors - We're Seeking Good Software Now!

```
ARKING LINE. ";:GOSUB470
190 IFINKEY$<>CHR$(13)THEN190
200 PRINT@0,"THE NEXT TWO LINES
ARE OUR ONE- QUARTER AND THREE Q
UARTER LINES.";:GOSUB460
210 IFINKEY$<>CHR$(13)THEN210
220 PRINT@0,"THE NEXT FOUR LINES
 INDICATE THEEIGHTHS OF AN INCH
ON OUR RULER.";:GOSUB430
230 IFINKEY$<>CHR$(13)THEN230
240 PRINT@0,"OUR SMALLEST MARKIN
GS OF AN INCHARE THE SIXTEENTHS
OF AN INCH.  ";:GOSUB390
250 IFINKEY$<>CHR$(13)THEN250
260 PRINT@0,WO$;:PRINT@0,"DO YOU
 WANT TO TRY AGAIN (Y/N) ?";
270 X$=INKEY$:IFX$="Y"THEN170
280 IFX$="N"THEN500
290 GOTO270
300 CLS0
310 C=5
320 FORI=0TO63:SET(I,6,C):NEXT
330 FORI=6TO28:SET(0,I,C):NEXT
340 FORI=0TO63STEP4:FORY=6TO10:S
ET(I,Y,C):NEXTY,I
350 FORI=0TO63STEP8:FORY=10TO16:
SET(I,Y,C):NEXTY,I
360 FORI=0TO63STEP16:FORY=16TO20
:SET(I,Y,C):NEXTY,I
370 FORY=20TO22:SET(32,Y,C):NEXT
380 RETURN
390 L=0:FORI=0TO18STEP4:L=L+2:PO
KE1218+I,47+L:NEXT
400 L=0:FORI=21TO31STEP4:L=L+2:P
OKE1216+I,49:POKE1217+I,47+L:NEX
T
410 FORI=0TO31STEP4:POKE1249+I,4
5:POKE1250+I,45:NEXT
420 FORI=0TO31STEP4:POKE1281+I,4
9:POKE1282+I,54:NEXT:RETURN
430 L=0:FORI=0TO31STEP8:L=L+2:PO
KE1316+I,47+L:NEXT
440 FORI=0TO31STEP8:L=L+2:POKE13
48+I,45:NEXT
450 FORI=0TO31STEP8:POKE1380+I,5
6:NEXT:RETURN
460 POKE1384,49:POKE1400,51:POKE
1416,45:POKE1432,45:POKE1448,52:
POKE1464,52:RETURN
470 POKE1424,49:POKE1456,45:POKE
1488,50
480 RETURN
490 DATA 1/16,1/8,3/16,1/4,5/16,
3/8,7/16,1/2,9/16,5/8,11/16,3/4,
13/16,7/8,15/16
500 GOSUB300:TM=0
```

H.D.R. SOFTWARE

ENHANCE YOUR COCO!

Enhance your CoCo with THE ENHANCER. It gives you 26 user-definable "soft keys" of up to 50 characters each. It gives you upper- and lower-case characters and 128 special characters in a 32-by-24 high-res display. The Enhancer gives you Pascal-like procedures, keyboard auto-repeat and much more. The Enhancer smoothly complements your CoCo's vocabulary. It uses NO user RAM! The Enhancer requires 64K, extended BASIC and comes on disk or tape. It costs U.S. $18.00.

See review in the May '86 issue of Rainbow Magazine.

TEXT PROCESSING POWER WITH TXEDIT

Why toy with other text editors? Get TXEDIT, the best word processor for the CoCo. Txedit uses the high-res screen to display true lower-case characters. It has graceful error recovery, and will retain all text even if you press RESET. It has powerful embedded formatting commands, including headers, footers, vertical and horizontal margins, page numbering, centering, right-justification, double-spaced printing, and any "special effects" your printer can handle. TXEDIT has a huge 47K text buffer. It is totally command-driven and user friendly — no more wading through endless menus. An online help screen is available to assist you. TXEDIT is lightning fast — it requires no slow disk "overlays." It takes less than 3 seconds to find a word at the end of a 17-page document! TXEDIT will work on a 64K CoCo with Radio Shack Disk BASIC (any version) and costs U.S. $44.95.

The Enhancer.....Disk or Tape, 64K.........$18.00
TXEDIT...........Disk only, 64K............$44.95

To order, send a cheque or money order to:
H.D.R. Software
27 Doyle Street
St. John's, NF
CANADA A1E 2N9 Tel. (709) 364-3125

BASIC COMPILER

WASATCHWARE believes that users of the Color Computer deserve the right to use all 64k of RAM that is available in the computer, and have fast machine language programs that use the full potential of the 6809 microprocessor. That is why the BASIC compiler, called MLBASIC was developed. Here are some of the reasons that make this compiler one of the best bargains in this magazine:

- Programs can use all 64k of RAM for either program storage or for large numbers of variables and arrays like A(20000)
- Full Floating Point arithmetic expressions with functions
- SUBROUTINE and CALL commands allows for structured programming and more independent program development
- Full sequential and direct access disk files allowed
- BASIC source and M.L. output I/O to disk, tape or memory

COMMANDS SUPPORTED

1. I/O -Commands
   CLOSE CLOADM CSAVEM DIR DRIVE DSKI$
   DSKO$ FIELD FILES GET INPUT KILL
   LSET OPEN PRINT PUT RSET
2. Program Control Commands
   CALL END EXEC FOR STEP NEXT
   GOSUB GOTO IF THEN ELSE ERROR
   ON..GO RETURN STOP SUBROUTINE
3. Math Functions
   ABS ASC ATN COS CVN EOF
   EXP FIX INSTR INT LEN LOG
   LOC LOF PEEK POINT PPOINT RND
   SGN SIN SQR TAN TIMER VAL
4. String Functions
   CHR$ INKEY$ LEFT$ MID$ MKN$ RIGHT$
   STR$ STRING$
5. Graphic/Sound Commands
   COLOR CLS CIRCLE DRAW LINE PAINT
   PCLEAR PCLS PLAY PMODE PRESET PSET
   RESET SCREEN SET SOUND
6. Other/Special Commands
   DATA DIM LLIST MOTOR POKE READ
   REM RESTORE RUN TAB VERIFY DLD
   DST IBSHFT LREG PCOPY PMODD PTV
   REAL SREG SWP VECTD VECTI

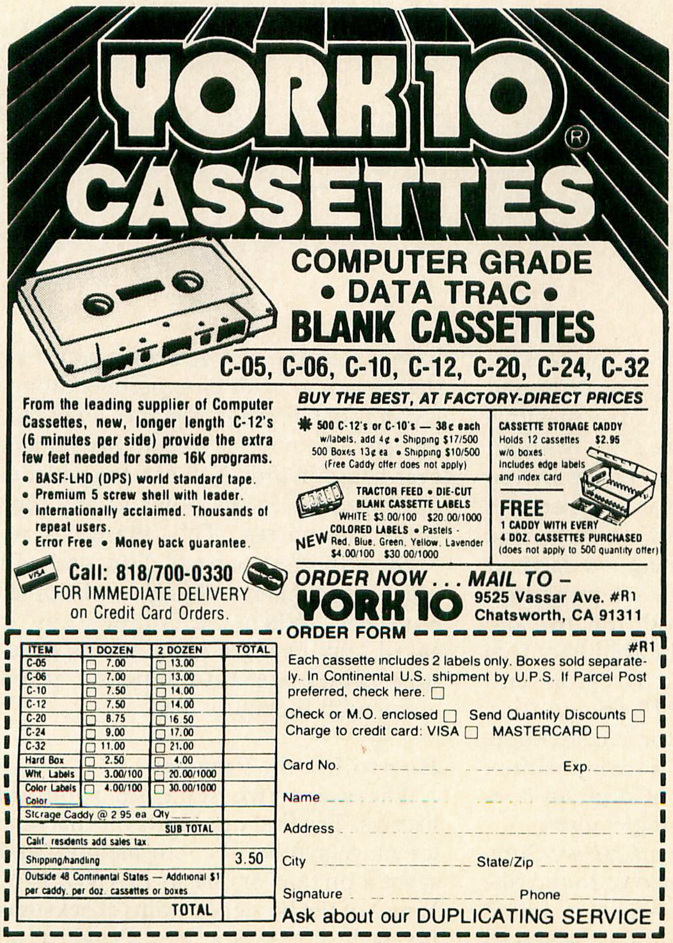
Tape- $69.95
Disk- $69.95 64K REQUIRED
Both- $74.95

RAINBOW CERTIFICATION SEAL

WasatchWare
7350 Nutree Drive
Salt Lake City, Utah
84121

Add $4.00 Postage and Handling
Send check or Money order.
No C.O.D.. Utah res. add 5% tax. Call (801) 943-6263

```
510 P=RND(15):K=P*4:FORI=0TOK:SE
T(I,4,8):NEXT
520 PRINT@0,"HOW LONG IS THIS LI
NE? ";
530 GOSUB760:IFK$=N$(P)THEN NC=N
C+1:GOTO600
540 PRINT@0,WO$;:IFTM=0THEN560
550 GOSUB390:GOSUB430:GOSUB460:G
OSUB470
560 NW=NW+1
570 TM=TM+1:IFTM>3THEN590
580 PRINT@0,"SORRY, TRY AGAIN: "
;:GOTO530
590 PRINT@0,WO$;:PRINT@0,"SORRY,
 IT IS ";N$(P);" INCHES LONG.":G
OTO620
600 PRINT@0,WO$;:PRINT@0,"VERY G
OOD! PLEASE PRESS <ENTER>!";
610 GOSUB390:GOSUB430:GOSUB460:G
OSUB470
620 X$=INKEY$:IFX$=CHR$(13)THEN5
00ELSEIFX$="@"THEN630ELSE620
630 CLS:PRINT:PRINT:PRINT
640 PRINTTAB(3)"PROBLEMS COMPLET
ED  = "NC+NW:PRINT
650 PRINTTAB(3)"CORRECT RESPONSE
S    = "NC:PRINT
660 PRINTTAB(3)"INCORRECT RESPON
SES = "NW:PRINT
670 TR=NC+NW:IFTR=0THENTR=1
680 SC=INT(NC/TR*100)
690 PRINTTAB(3)"YOUR TOTAL SCORE
 = "SC"%":PRINT
700 PRINTTAB(3)"ANOTHER TRY (Y/N
) OR (C) ?";
710 X$=INKEY$:IFX$=""THEN710
720 IFX$="Y"THEN RUN
730 IFX$="N"THEN CLS:END
740 IFX$="C"THEN 500
750 GOTO710
760 PRINT"=> ";
770 Y$=""
780 X$=INKEY$:IFX$=""THEN780
790 IFX$=CHR$(13)THEN880
800 IFX$=CHR$(8)THEN860
810 IFX$="@"THEN630
820 IFX$=" "THEN780
830 IF ASC(X$)<13THEN780
840 IF ASC(X$)>64 THEN780
850 Y$=Y$+X$:PRINTX$;:GOTO780
860 WW=LEN(Y$):IFWW=0THEN770
870 PRINTX$;:Y$=LEFT$(Y$,WW-1):G
OTO780
880 PRINT
890 K$=Y$
900 RETURN
```



COMPUTER GRADE
• DATA TRAC •
BLANK CASSETTES

C-05, C-06, C-10, C-12, C-20, C-24, C-32

From the leading supplier of Computer Cassettes, new, longer length C-12's (6 minutes per side) provide the extra few feet needed for some 16K programs.

- BASF-LHD (DPS) world standard tape.
- Premium 5 screw shell with leader.
- Internationally acclaimed. Thousands of repeat users.
- Error Free • Money back guarantee.

Call: 818/700-0330
FOR IMMEDIATE DELIVERY
on Credit Card Orders.

BUY THE BEST, AT FACTORY-DIRECT PRICES

✱ 500 C-12's or C-10's — 38¢ each w/labels, add 4¢ • Shipping $17/500
500 Boxes 13¢ ea • Shipping $10/500
(Free Caddy offer does not apply)

TRACTOR FEED • DIE-CUT BLANK CASSETTE LABELS
WHITE $3.00/100 $20.00/1000
NEW COLORED LABELS • Pastels - Red, Blue, Green, Yellow, Lavender
$4.00/100 $30.00/1000

CASSETTE STORAGE CADDY
Holds 12 cassettes $2.95
w/o boxes.
Includes edge labels and index card

FREE
1 CADDY WITH EVERY 4 DOZ. CASSETTES PURCHASED
(does not apply to 500 quantity offer)

ORDER NOW . . . MAIL TO –
YORK 10
9525 Vassar Ave. #R1
Chatsworth, CA 91311

ORDER FORM

ITEM	1 DOZEN	2 DOZEN	TOTAL
C-05	☐ 7.00	☐ 13.00	
C-06	☐ 7.00	☐ 13.00	
C-10	☐ 7.50	☐ 14.00	
C-12	☐ 7.50	☐ 14.00	
C-20	☐ 8.75	☐ 16.50	
C-24	☐ 9.00	☐ 17.00	
C-32	☐ 11.00	☐ 21.00	
Hard Box	☐ 2.50	☐ 4.00	
Wht. Labels	☐ 3.00/100	☐ 20.00/1000	
Color Labels Color ____	☐ 4.00/100	☐ 30.00/1000	
Storage Caddy @ 2.95 ea Qty ___			
		SUB TOTAL	
Calif. residents add sales tax			
Shipping/handling			3.50
Outside 48 Continental States — Additional $1 per caddy, per doz. cassettes or boxes			
		TOTAL	

#R1

Each cassette includes 2 labels only. Boxes sold separately.. In Continental U.S. shipment by U.P.S. If Parcel Post preferred, check here. ☐

Check or M.O. enclosed ☐ Send Quantity Discounts ☐
Charge to credit card: VISA ☐ MASTERCARD ☐

Card No. ____________ Exp. ______
Name ____________
Address ____________
City ____________ State/Zip ____________
Signature ____________ Phone ______

Ask about our DUPLICATING SERVICE

Personal Stationery for Personal Computers

Now, a unique quality stationery for the personal computer user.

Perfect for letters, thank you notes and correspondence of all types.

Give your computer correspondence the personal touch.

- Designed, continuous feed, Classic® Laid and Linen stationery.
- Dozens of pre-printed designs available.
- The perfect gift for all personal computer users, family, friends, business associates and children.

Write Today for Free Sample and Brochure

hi-tech Stationery
5901 Warner Ave. Suite 270-B
Huntington Beach, CA 92649

hi-tech Stationery

Quality Stationery for Personal Computers

CoCo Synthesizer Produces

Even if you don't know much about music, banging away on the keys of a piano can be a lot of fun. If you have always wanted to compose music, but didn't have an instrument or the time to learn how to play, now you do. The CoCo *Piano-Synthesizer/Composer* makes composing tunes easy. It turns the CoCo's keyboard into a piano keyboard, remembers the notes played and plays them back at any tempo you choose. It provides a powerful editor for correcting or altering the stored music data.

Martin and Jeremy Spiller are a father and son team from Shirley, Massachusetts. Martin is a dentist and enjoys programming in his spare time. Jeremy is 14 years old and hopes to own his own software company someday.

The CoCo piano allows you to save each composition on tape or disk, and to load them as stand-alone machine language programs that `EXEC` without the help of the BASIC language driver. Furthermore, it automatically creates `PLAY` statements complete with line numbers and stores them on tape or disk for merging into BASIC programs. This function is in addition to, and totally separate from, the ability to store the music as synthesized ML programs. You may reload your ML composition back into the BASIC editor at a later date and add to or edit the composition. Please note that the CoCo piano does not play chords, only single notes.

The CoCo *Piano-Synthesizer/Composer* can be programmed to sound like a wide variety of instruments (as well as non-instruments). It contains two envelope tables that can be programmed by the user. With a bit of experimentation, it can sound like a jazz piano, an organ, an echo chamber or like no instrument ever heard before. You can toggle from one envelope to the other at any time while composing. This change is recorded in the musical data and, on playback, toggles a change to the other envelope. When the composition is saved, any changes made in the envelope tables are automatically saved along with the music data.

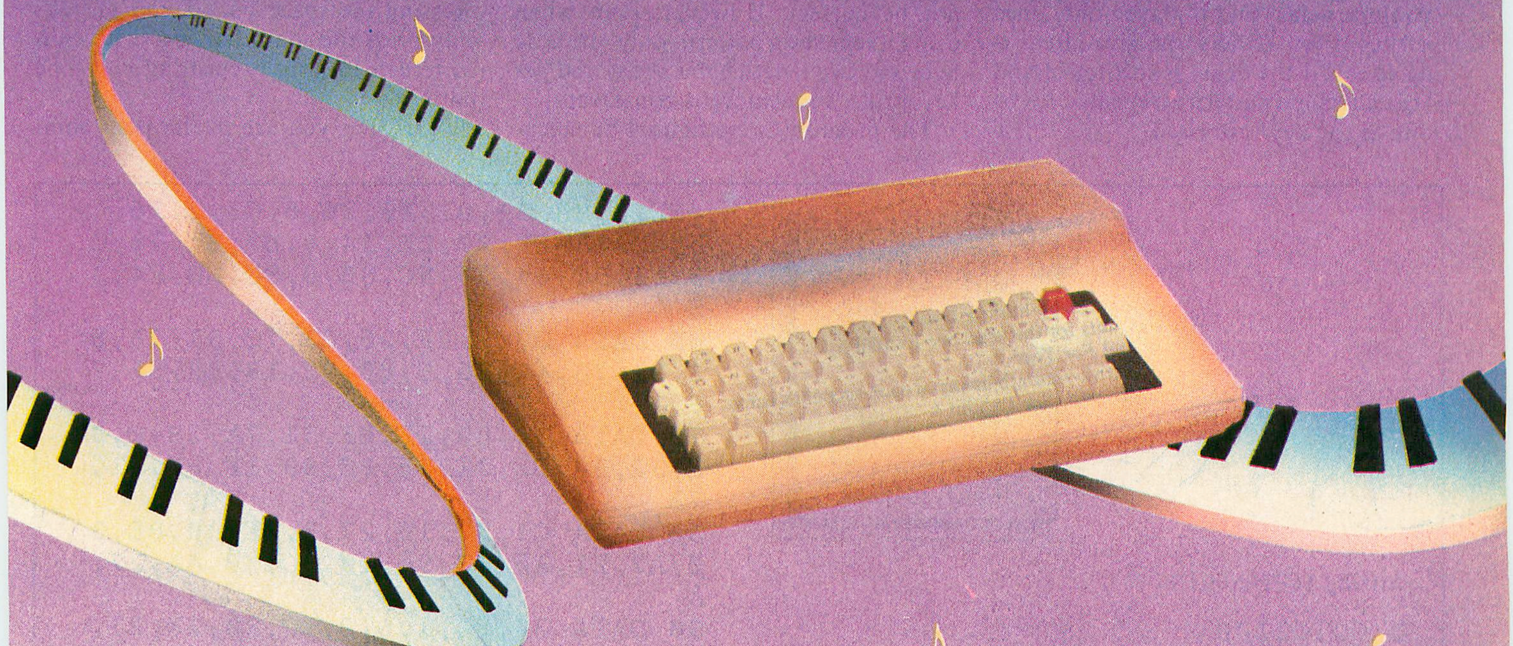
How to Use the Program

There are two separate program listings. The first one boots the machine language synthesizer into memory and saves it on tape or disk as *PIANO/BIN*. Line 2 of the booter contains checksums for each of the data lines. Provided all

16K
ECB

Out-Of-This-World Sounds

By Martin and Jeremy Spiller



of the entries in Line 2 are correct, the program tells in which line you have made a mistake in typing the rest of the data statements. Do not renumber this program! If you get an error report and can't find the error in the line reported, check to see if the checksum in Line 2 is correct.

The second program listing is the BASIC language utility that allows easy management of the ML program. While keying it in, it is best to include only those spaces between commands that you see in the listing. We economized on memory to allow 16K users to use the piano, and extra spaces use extra memory. Save this program on disk or tape as *PIANO/BAS*. *PIANO/BAS* loads *PIANO/BIN* each time it is run, so both programs should be on the same disk or tape. Run the BASIC program. A prompt asks if the ML program is to be loaded from tape or disk. Once the ML program has been loaded, the main menu appears.

Now press '1'. This puts you in the play/compose mode. Begin playing music and the computer stores the notes and their lengths. The length of the note depends mostly on the length of time your finger remains on the key. However, the program does record information on the length of time between keystrokes up to a maximum of one second.

In this mode, a text screen representation of the keyboard appears on the TV. The keyboard looks like a two-tiered organ keyboard. All of the keys in the second row and most of the keys in the bottom row are mapped to resemble the white keys on a piano. They are each marked with the note that the key plays when depressed. The keys above them represent the black keys on the piano. Notice that some of the keys in the first and third rows are colored blue on the map. These keys produce no sound when pressed, and are not recorded in music memory. They represent sharps and flats that do not exist on the chromatic scale; their omission gives the keyboard the appearance of a piano keyboard.

Three octaves are represented, starting at middle C. They go from the up-arrow key to the 'Y' key, from the 'U' key to the right-arrow key, and from the 'Z' key to the '<' key.

Some of the keys are colored red — these are control keys. They are the CLEAR, ENTER, SHIFT, '?' and space bar. These can be pressed at any time while in the play/compose mode. The SHIFT key exits the synthesizer and returns to the main menu.

In order to simplify playing the keyboard, consider using black-and-white self-adhesive tabs to cover the appropriate keys. These can be obtained at any stationery store. If you can't find these, try small pieces of colored electrician's tape.

Playing versus Composing

The machine code program was originally formulated to allow experimentation. The object was to allow the user to modify a pure tone by manipulating its volume over time. This is done by specifying the volume at discrete intervals in what is known as an envelope pattern. Some envelope patterns, such as the piano envelope, sound lovely if stretched out over a long period (a high envelope delay) and if played only once per key press. Others can give interesting effects if the delay is shortened and if the envelope pattern is repeated for as long as the key is pressed.

As the program evolved, however, the keyboard developed into a piano and we decided to store the notes and their lengths in memory. We discovered that when repeating patterns were used, memory filled up too fast. For this reason, we decided to allow composing only in the non-repeating mode. While you get meaningful note data in the repeating mode, the length data may not be correct. However, even when using a repeating pattern, only one note byte and two length bytes are stored per key strike, so memory is conserved.

The program is configured at execution for composing. We have chosen an arbitrary envelope delay (representing tempo) of 1100, and a non-repeating piano envelope as default. Whenever a note key is pressed in the play/compose mode, note and length data is stored in memory whether you want to keep the data or not. You will store meaningful length data as long as you do not switch to a repeating envelope pattern by pressing the space bar. If you mistakenly press the space bar, press it again to return to a non-repeating envelope pattern.

Now that you are in the play/com-

> ***"It can sound like a jazz piano, an organ, an echo chamber . . ."***

180	237
280	161
410	247
480	33
590	91
750	23
860	71
960	163
8014	164
END	183

Listing 1: PIANOBIN

```
0 GOTO1000
1 CLEAR200,&H2FFF
2 DATA 1847,2952,2629,2549,2518,
1653,1806,1698,1525,2938,1478,17
37,1948,2446,2333,1796,1916,1631
,1711,1186,867,1187,1180,1006,16
98,879,1382,1025,1322,1544,1951,
2067,2059,1813,1907,2319,2268,16
09,1754,2414,1878,2275,637
4 DIM SUM(43):FOR Z=1 TO 43:READ
SUM(Z):NEXT Z
10 DATA 8D,11,7F,31,78,8E,32,19,
BF,31,76,30,88,1F,BF,31,7A,20,1B
,B6
20 DATA FF,1,84,F7,B7,FF,1,B6,FF
,3,84,F7,B7,FF,3,B6,FF,23,8A,8
30 DATA B7,FF,23,1A,50,39,1C,FE,
BE,31,76,BF,31,73,FE,31,7C,86,FF
,B7
40 DATA FF,2,C6,FF,5C,79,FF,2,B6
,FF,0,8A,80,81,FF,26,6,C1,7,26
50 DATA EF,20,DB,34,4,B7,31,75,C
6,FF,5C,46,25,FC,86,8,3D,EB,E4,3
5
60 DATA 2,C1,2F,26,23,7C,31,78,B
6,31,78,44,25,E,8E,32,19,BF,31,7
6
70 DATA 30,88,1F,BF,31,7A,20,C,8
E,32,3A,BF,31,76,30,88,1F,BF,31,
7A
80 DATA C1,37,10,27,2,1E,10,8E,3
0,A2,E1,A0,27,94,10,8C,30,AA,27,
A
90 DATA 20,F4,1,6,B,1C,20,23,27,
37,C1,1F,26,31,7C,31,79,B6,FF,0
100 DATA 8A,80,81,FF,26,F7,16,FF
,71,B6,FF,0,8A,80,81,FF,26,F7,BE
,33
110 DATA D,86,20,A7,1,17,2,3F,E7
,2,30,3,BF,33,D,BC,31,7E,24,69
120 DATA 16,FF,4F,C1,31,26,F,BE,
33,D,30,1D,8C,33,4C,25,C4,BF,33,
D
130 DATA 20,BF,8E,31,80,86,3,3D,
3A,A6,2,A7,9F,33,D,EC,84,34,6,A6
140 DATA 9F,31,73,84,FC,E6,E4,8D
,7,4F,E6,61,8D,2,20,EF,5A,26,2F,
8A
150 DATA 2,B7,FF,20,B6,FF,0,8A,8
0,B1,31,75,27,1F,32,64,FC,31,73,
B3
160 DATA 31,76,BE,33,D,E7,1,17,1
,D9,E7,2,30,3,BF,33,D,BC,31,7E
```

pose mode, go ahead and try playing some music. For 16K users, about 1,000 notes can be stored before running out of room; 32K users should be able to bang away for most of the day before hitting the top of RAM. If this happens, don't worry. The binary program checks to see if the limit has been reached and returns to the menu. Nothing has been lost, and you can still play back, alter and save the stored data.

Each time a note key is pressed, the CoCo remembers the note and the length of time your finger was on the key. It also keeps track of the time between keystrokes up to a second. If you are inexperienced and spend a lot of time looking for the next key to press, the program takes no notice beyond one second. For experienced piano players, the only problem is getting used to the keyboard itself. Remember that if you press a second key while the first is still pressed, there will be no response until you take your finger off the first key.

The Control Keys

Correction of mistakes in the play/compose mode is limited to the CLEAR key. Whenever this key is pressed, the last note played is eliminated. Pressing it twice or three times eliminates the last two or three notes played. The entire composition can be eliminated this way. Any notes eliminated are replaced with the next note keys pressed.

When you are finished composing and want to return to the main menu, simply press either SHIFT key. If you mistakenly exit the play mode, return to the same position in the composition by pressing '2' at the menu. Beware. If the '1' is pressed, the program assumes you want to compose a new piece and dumps any music already in memory.

The computer keeps track of pauses that last up to one second. This creates a problem with longer or multiple pauses that normally occur in musical notation. The ENTER key makes it possible to place pauses in the music. It works the same way the note keys work. The pause lasts for as long as you press the ENTER key. During composition, this creates a high pitched noise that indicates something is being pressed. This noise does not occur on playback.

Of course, if you are only fooling around with the synthesizer and do not care about what is stored in memory, you do not need the pause button at all. You will, however, want to use the space bar. This control toggles between repeating envelopes and single envelope strikes. Remember that repeating envelopes do not give meaningful note length data and should be avoided when composing.

The final control key is the question mark-slash key. The synthesizer program contains two programmable envelope tables. The question mark key toggles between the two tables and allows playing of different parts of a composition with different sounding envelopes. Any time this control key is

```
170 DATA 24,3,16,FE,E9,39,33,5F,
11,83,0,0,26,C6,FE,31,7C,BE,31,7
3
180 DATA 30,1,BC,31,7A,27,5,BF,3
1,73,20,B4,B6,31,79,44,25,5,32,6
4
190 DATA 16,FF,52,BE,31,76,BF,31
,73,20,A1,32,19,BF,32,19,0,0,32,
38
200 DATA 4,4C,7F,FF,3F,3F,14,1,1
,80,1F,1F,20,25,25,1D,27,28,1C,9
0
210 DATA 90,6,1,1,80,20,21,1F,1D
,1E,21,53,53,F,1A,1B,23,1,1,80
220 DATA 15,16,26,19,19,24,1C,1C
,22,4B,4B,11,47,47,12,AC,AC,3,80
,80
230 DATA 8,2D,2D,1A,71,71,A,5E,5
E,D,22,22,1E,98,98,5,2A,2A,1B,65
240 DATA 65,C,30,2F,19,C1,C1,1,1
,1,80,37,39,16,31,31,18,0,0,0
250 DATA 1,1,80,B6,B7,2,A2,A2,4,
1,1,80,88,88,7,78,79,9,6B,6B
260 DATA B,1,1,80,58,59,E,4F,4F,
10,43,43,13,13,13,28,17,17,25,3B
270 DATA 3B,15,14,14,27,1,1,64,5
,5,FF,1,1,64,34,34,17,FF,CA,AA
280 DATA 91,7E,6B,5B,50,46,3D,35
,2D,28,22,1D,1A,17,15,12,10,F,D,
C
290 DATA A,9,8,7,6,5,4,3,2,1,FF,
89,44,4,E6,95,41,4,D2,91
300 DATA 41,4,C0,79,41,4,AD,70,3
4,4,9A,63,2C,4,86,54,29,4,74,48
310 DATA 22,0,17,FD,B6,7F,31,78,
10,8E,33,4C,8E,32,19,BF,31,76,FE
,31
320 DATA 7C,BE,31,76,BF,31,73,10
,BC,33,D,27,37,E6,21,BE,31,76,3A
,BF
330 DATA 32,B1,E6,A4,8E,31,80,C1
,64,26,1D,7C,31,78,B6,31,78,44,2
5,A
340 DATA 8E,32,19,BF,31,76,31,23
,20,CC,8E,32,3A,BF,31,76,31,23,2
0,C2
350 DATA E1,2,27,7,30,3,20,F8,39
,32,33,EC,84,34,6,A6,9F,31,73,E6
360 DATA A4,C1,FF,26,1,4F,E6,E4,
8D,7,4F,E6,61,8D,2,20,EA,5A,26,2
8
370 DATA 8A,2,B7,FF,20,BE,31,73,
BC,32,B1,10,23,FE,66,8D,55,CE,0,
32
380 DATA 33,5F,11,83,0,0,26,F8,3
0,1,BF,31,73,32,64,31,23,16,FF,7
2
390 DATA 33,5F,11,83,0,0,26,CD,F
E,31,7C,BE,31,73,30,1,BF,31,73,2
0
400 DATA C0,33,4C,C6,1,7F,FF,2,B
6,FF,0,8A,80,81,FF,10,26,FE,26,4
F
410 DATA 10,21,FD,A,10,21,FD,6,4
C,27,2,20,F3,5C,C1,FF,10,27,FE,1
1
420 DATA 20,DE,5F,4F,10,21,FC,F2
,10,21,FC,EE,4C,26,F5,5C,E1,22,1
```

pressed, a code is stored in the music memory that triggers a corresponding shift during playback.

Envelope Delay and Play Delay

How long is a whole note? The longest note stored in memory is a whole note and is proportional to the envelope delay. Press a note key in the default mode and listen carefully. The sound trails off to nothing. The length of time it takes for the sound to fade away totally is the longest note length stored in memory. Keeping your finger on a key longer does not lengthen the time between that note and the next during playback.

If you are playing a very slow tempo piece and need a longer whole note, simply increase the envelope delay. If you are playing a very fast piece and want to hear more of a fadeoff during short keystrokes, shorten the envelope delay. It is best to alter the envelope delay before storing data to keep. A short keystroke with a long envelope delay causes the program to store only a part of the entire envelope. Increasing the envelope delay after the data has been stored lengthens the note, but it does not increase the proportion of the envelope played. The envelope delay may be altered from the main menu by pressing the "change tempo" option. Numbers between one and 65,535 will work. Try the default envelopes using an envelope delay of 500.

The play delay can also be altered from the main menu by pressing "change tempo." While the envelope delay has an effect in both the play and playback modes, the play delay operates only in the playback mode. It accounts for a constant pause between notes when they are played back. It is included as a fine adjustment for playback timing. The default value is 50.

This is the first parameter to alter if the playback is too fast or too slow. Values between one and 65,535 are accepted. Small increases or decreases don't make much difference, so don't be afraid to change it by factors of 1,000. You may later the play delay or the envelope delay at any time, even after composing a piece. They do not affect the stored music data once it has been

```
0,27
430 DATA FF,66,20,EB,D
435 Z=0:SUM=0:L=10
440 FOR X=&H3000 TO &H334C:READA
$:A$="&H"+A$:A=VAL(A$):POKEX,A:S
UM=SUM+A:Z=Z+1:IFZ=20 OR X=&H334
C THEN 450 ELSE NEXT X
450 PRINT"WORKING ON LINE #";L:
IF SUM<>SUM(L/10) THEN CLS3:PRIN
T@257,"ERROR IN LINE #";L;:END
460 SUM=0:L=L+10:Z=0:IF X=&H334C
 THEN 470ELSE NEXT X
470 CLS:PRINT"ENTER SYSTEM SIZE
(16 OR 32)":INPUT A
480 IF A=16 THEN POKE&H317E,&H3F
:POKE&H317F,&H80:GOTO 510
490 IF A=32 THEN POKE&H317E,&H7F
:POKE&H317F,&H80:GOTO510
500 GOTO 470
510 CLS:INPUT"(C)ASETTE OR (D)IS
K";D$:IF D$="D"THEN SAVEM"PIANO"
,&H3000,&H334C,&H325A:END
520 CSAVEM"PIANO",&H3000,&H334C,
&H325A
1000 PCLEAR1:GOTO1
```

80	92
180	54
320	85
410	226
END	5

Listing 2: PIANOBAS

```
5 GOTO20000
10 CLS:PRINT"PLEASE REMOVE JOYST
ICK FROM      RIGHT JOYSTICK PORT
":PRINT
14 CLEAR255,&H2FFF
20 INPUT"(C)ASETTE OR (D)ISK";D$
:IF D$="C"THENCLOADM"PIANO"ELSEL
OADM"PIANO"
40 DIMN$(12)
50 CLS:PRINT@14,"MENU":PRINT
60 PRINT"  1) COMPOSE MUSIC"
70 PRINT"  2) ADD ON TO MUSIC"
80 PRINT"  3) PLAY MUSIC"
90 PRINT"  4) SAVE MUSIC"
100 PRINT"  5) LOAD MUSIC"
110 PRINT"  6) CHANGE ENVELOPE"
120 PRINT"  7) CHANGE TEMPO"
130 PRINT"  8) ASSEMBLE TO PLAY
COMMANDS"
140 PRINT"  9) EDIT YOUR COMPOSI
TION"
150 PRINT@480," ";:A$=INKEY$:IFA
$=""THEN150
160 B$=INKEY$:FORX=&H152 TO&H152
+7:IFPEEK(X)=255THENNEXT:GOTO170
ELSE160
170 ONVAL(A$)GOTO300,310,320,330
,340,360,440,8000,500
180 GOTO50
190 CLS:A$="c d z f g a z c d z
f g a":B$="C D E F G A B C D E F
 G A B":FORX=1TOLEN(A$):C$=MID$(
A$,X,1):IF C$="z"THENMID$(A$,X,1
)=CHR$(175)
200 IFC$=" "THENMID$(A$,X,1)=CHR
$(128)
210 NEXT:FORX=1 TOLEN(B$):C$=MID
$(B$,X,1):IFC$=" "THENMID$(B$,X,
1)=CHR$(138)
220 NEXT:CLS0
230 PRINT@4,A$;:PRINT@67,B$;:A$=
CHR$(175)+CHR$(170)+CHR$(175)+CH
R$(170)+A$:A$=LEFT$(A$,22):A$=A$
+STRING$(4,255)+CHR$(128)+CHR$(2
55):PRINT@132,A$;:B$=STRING$(3,2
55)+CHR$(133)+B$:B$=LEFT$(B$,21)
```

placed in memory, but they affect the playback of that data.

Programming the Envelope Tables

Before programming an envelope, you must know something about synthesizing periodic sounds. The CoCo has no sound-generating circuitry. In order to produce sounds, the microprocessor must minutely manipulate the voltage output to the loudspeaker. (That it can do this quickly enough to produce a fantastic array of sounds is a testament to the extreme versatility of the 6809 and the Color Computer.)

In order to produce the sound of a particular instrument, most hardware synthesizers produce a particular sine wave electrical output varying between zero and five volts. This pure tone is then modified to produce the same general pattern of electrical output as the sound output of the instrument it is trying to mimic. The unmodified sine wave produces a pure tone of a particular volume depending upon the maximum voltage allowed by the circuitry. The envelope modifications are mainly constraints on the volume of the sine wave over time.

To produce the sound of a piano, it begins with a maximum volume when the key is struck, falling off rather quickly at first and then more slowly until it fades out entirely. This is exactly what the CoCo *Piano-Synthesizer* does: It produces a square wave instead of a true sine wave, the maximum voltage of which is controlled by the values in the envelope table.

Go back to the main menu and press '6'. When the prompt asks which table to use, press '1' and ENTER. Now remember what we said about the fast falloff and a gentle fadeout? The graph shown is the envelope used to produce the piano default sound. This envelope can be altered or a totally new one created by using the left joystick and firebutton. For example, position the cursor at the bottom left side of the screen and press the firebutton. The original point disappears and is replaced by the new one. Now move the cursor one position to the right and four above the one just set and press the firebutton again. Continue this process,

```
:B$=B$+CHR$(128)+CHR$(255)+CHR$(
128)+STRING$(3,255)
240 FOR X=1TOLEN(B$):IFMID$(B$,X
,1)=CHR$(138)THENMID$(B$,X,1)=CH
R$(133):NEXT ELSE NEXT
250 PRINT@196,B$;:PRINT@267,STRI
NG$(11,255);
260 PRINT@384,"ENTER = PAUSE : ?
 = NEW ENVELOP"
270 PRINT"SHIFT = MENU  : CLEAR=
BACKSPACE"
280 PRINT"      SPACEBAR=REPEAT T
OGGLE
290 RETURN
300 GOSUB190:POKE&H330D,&H33:POK
E&H330E,&H4C:EXEC&H3000:GOTO50
310 GOSUB190:EXEC&H3000:GOTO50
320 GOSUB190:EXEC&H325A:GOTO50
330 CLS:S=&H3000:E=PEEK(&H330D)*
256+PEEK(&H330E):PRINT"SAVE":INP
UT"ENTER SONG NAME";F$:INPUT"(C)
ASETTE OR (D)ISK";D$:IF D$="D" T
HEN SAVEM F$,S,E,&H325A:GOTO50
335 CSAVEMF$,S,E,&H325A:GOTO50
340 CLS:PRINT"LOAD:":INPUT"ENTER
 SONG NAME:";F$:INPUT"(C)ASETTE
OR (D)ISK";D$:IFD$="C"THENCLOADM
F$ ELSELOADMF$
345 GOTO50
350 IFC=0THENRESET(A,B):RETURNEL
SESET(A,B,3):RETURN
360 CLS:INPUT"WHICH ENVELOPE DO
YOU WANT TO    CHANGE (1 OR 2)";
E
370 IFE=0THENE=1
380 IFE=1THENE=&H3219 ELSEE=&H32
3A
390 CLS0
400 FORX=0TO63STEP2:A=PEEK(E):SE
T(X,31-INT(PEEK(E)/8),3):E=E+1:N
EXT:E=E-32
```

```
410 Z=JOYSTK(0):A$=INKEY$:IFA$<>
""THEN50ELSEA=JOYSTK(2):A=INT(A/
2):A=A*2:B=JOYSTK(3):B=INT(B/2):
C=POINT(A,B):SET(A,B,3):FORX=1TO
20:NEXT:GOSUB350:IFPEEK(&HFF00)=
253THEN430
420 GOTO410
430 POKEE+A/2,255-(B*8):FORY=0 T
O31:RESET(A,Y):NEXT:SET(A,B,3):G
OTO410
440 PLYDLY=PEEK(&H32E2)*256+PEEK
(&H32E3):ENVDLY=PEEK(&H317C)*256
+PEEK(&H317D)
450 CLS:PRINT"CURRENT PLAYDELAY=
";PLYDLY:PRINT"HIGHER OR LOWER V
ALUES WILL     LENGTHEN OR SHORT
EN PAUSES BE-  TWEEN NOTES ON PL
AYBACK ONLY.   ENTER NEW VALUE,
OR <ENTER>     TO LEAVE THE SAME
"
460 INPUTA:IFA<>0THENB=INT(A/256
):C=A-256*B:POKE&H32E2,B:POKE&H3
2E3,C
470 CLS:PRINT"CURRENT ENVELOPE D
ELAY=";ENVDLY:PRINT"LOWER VALUES
 WILL COMPRESS THE  ENVELOPE INT
O A SHORTER TIME    AND INCREASE
 THE TEMPO OF BOTH  COMPOSITION
AND PLAYBACK. ENTER NEW VALUE OR
<ENTER> TO LEAVE    THE SAME"
480 INPUTA:IFA<>0THENB=INT(A/256
):C=A-256*B:POKE&H317C,B:POKE&H3
17D,C
490 GOTO50
500 CLS:S=&H334C:P=0:FS=0:CP=0:M
=256*PEEK(&H330D)+PEEK(&H330E):L
P=(M-S)/3:GOSUB510:GOTO520
510 N$(1)="C":N$(2)="C#":N$(3)="
D":N$(4)="D#":N$(5)="E":N$(6)="F
":N$(7)="F#":N$(8)="G":N$(9)="G#
":N$(10)="A":N$(11)="A#":N$(12)=
```

TURBO-M™

Check Out Our Systems — High **QUALITY** 4 layer ***TURBO*** motherboard at the **LOWEST** prices.
Our hard drive systems — an **EXTRA** megabyte of Storage ***FREE***
(more megabytes for less megabucks)
Our monitors are high resolutions with minimum 1,000 lines
*— They even have their own tilt and swivel base **at no added cost.** —*
Powered by a heavy duty power supply, and offering ***TRUE*** turbo speed.
ONE FULL YEAR WARRANTY

COMPARE OUR SYSTEMS — TURBO M is the COMPETITION

SYSTEM-A-SINGLE FLOPPY SYSTEM

$899.95!

SYSTEM 22-HARD DRIVE SYSTEM

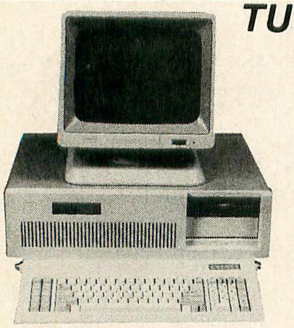
22 MEGABYTE SYSTEM
$1,399.95!

TURBO M PC COMPLETE SYSTEM

Dual Speed CPU — 4.77 AND TURBO
NEC V20 PROCESSOR

- **640 K memory**
- **8 slot motherboard**
- **135 Watt Power Supply**
- **Monochrome TTL Card**
- **Monochrome Display High Res**
- **Tilt and Swivel Base Monitor**
- **Serial port (2nd port opt.)**
- **2 parallel ports**
- **Clock calendar**
- **Game Port**
- **Keyboard 5151 Style**
- **Ram spooler and Printer spooler system**
- **DOS 2.11**

Toll Free Ordering 1-800-343-8841



TURBO M / AT—COMPLETE SYSTEMS

STARTING AT $2,359.95 !!!
ONE FULL YEAR WARRANTY

Comes Complete with
- **6 and 8 MHZ Switch Selectable**
- **8 Slot Motherboard**
- **192 Watt Power Supply**
- **1.2 Megabyte Floppy Drive**
- **1 Full Megabyte of Memory on Motherboard**
- **2 Parallel Ports — 2 Serial Ports**
- **Clock Calendar**
- **Hercules Compatible Monochrome Card**
- **Monochrome Display-High Resolution**
- **Tilt and Swivel Base**
- **DOS 3.1 — AT Keyboard**

ADD-IN BOARDS TO HELP YOU BUILD YOUR SYSTEM

TURBO-M Motherboad Dual Speed **$299.95**	Monochrome Graphics Card with Printer Port **$94.95**	Floppy I/O Card Controls Two Floppy Drives, Serial Port Parallel Port Clock Calendar Game Port **$109.95**	Winchester Hard Drive Controller **$139.95**	10 Megabyte and 20 Megabyte Drives Complete System Drive, Controller, Cables and easy to follow instructions. **$369.95 — $469.95**		Color Graphics Card with Printer Port **$118.95**
135 Watt Power Supply **$89.95**	Multi Function Card with Space for 384K of Memory, Serial Port, Parallel Port Clock Calendar, Game Port **$89.95**	5151 Compatible Keyboard with Separate Cursor and Number Pads **$124.95**	Monochrome Monitor with High Resolution Tilt/Swivel Base **$179.95**	Floppy Drive Card Control up to Four Drives **$79.95**	P.C.DOS 3.1 **$80.00**	Flip Top Cabinet with Speaker **$64.95**

MEGADISK™ HARD DRIVES

Our Hard Drive Systems Are Compatible With
IBM PC and AT, HEATH/ZENITH, COMPAQ, COLUMBIA, PC CLONES, TAVA, EAGLE
TRS/80 Models I / III / IV / 4D / 4P / MAX 80 / COLOR COMPUTER, Tandy 1000

Systems come complete with drive, controller, cables, hardware and easy to follow instructions.

IBM Etc.

5 megabytes	starts at $239.95
10 megabytes	starts at $369.95
20 megabytes	starts at $469.95
60 megabytes	starts at $1,299.95

REMOVABLE MEDIA SPECIAL

5 Megabyte Cartridge Hard Drive Now Specially Priced!

Systems come complete with one free software driver for TRSDOS 6, LDOS 5.1.x, DOSPLUS 3.4/4, or NEWDOS 80.CP/M is available.

TRS/80

5 megabytes	$449.95
10 megabytes	$679.95
15 megabytes	$749.95
20 megabytes	$849.95
24 megabytes	$899.95
30 megabyte-fixed & removeable	$1,399.95
40 megabytes	$1,299.95
50 megabytes	$1,449.95

Warranty Information: TURBO-M systems come with a full year warranty for parts and labor.
TURBO-M systems are guaranteed to run all programs such as LOTUS, SYMPHONY, AUTOCAD, FLIGHT SIMULATOR, DBASE, MICROGRAPFX, WORDSTAR, LEADING EDGE W/P, RBASE.
MEGADISK hard drives are fully warranteed for parts and labor.

TERMS and CONDITIONS:
All prices are cash discounted. However, we do accept MC, VISA, AMEX & DISCOVER credit cards. Please inquire.
C.O.D.'s are accepted-No deposit required.
Purchase Orders-Corporate, Government & School P.O.'s are accepted. Please call for details.
Shipping Costs are calculated per order. Please call for total.
Shipments of all in-stock products are made within 24 hours, same day service is available upon request at no added cost.
Not responsible for typographical errors.

SOFTWARE SUPPORT, INC
1 Edgell Road
Framingham, MA 01701
1-617-872-9090
Hours: Mon.-Fri. 10 am to 5:30 pm (est) Sat 4:00 pm
Toll Free Ordering 1-800-343-8841
Dealer Inquiries Invited

Service & Returns: It is our policy to repair all service returns within 24-48 hours. Normally same day turn-a-round is accomplished. It is necessary to have a (R)eturn (M)aterial (A)uthorization to insure speedy service.

IBM, TAVA, COLUMBIA, 5151, COMPAQ, EAGLE, TRS/80, HEATH/ZENITH are registered trademarks of IBM Corp., Tava Corp., Columbia Computer Corp, Key Tronics Corp, Compaq Corp, Eagle Computer, Tandy Corp, Zenith Corp, respectively.

1986 Software Support, Inc. *All rights reserved*

Prices Change
Every Day.
Please Call
1-800-343-8841
For Lower Prices.

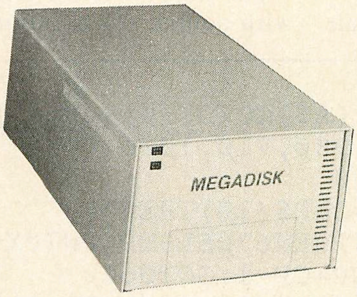
PRICE BREAKTHROUGH

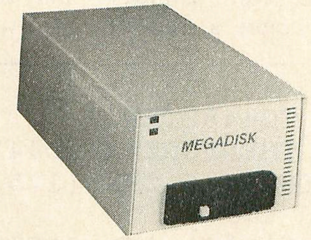
DEALER INQUIRIES INVITED

Prices Change
Every Day.
Please Call
1-800-343-8841
For Lower Prices.

Super Sale on New Hard Drives
Announcing MEGADISK PLUS +

Complete Systems! for the TRS 80 Model I/III/IV/4P, Color Computer, IBM-PC & AT, Max/80
Software Drivers: LDOS, NEWDOS/80, DOSPLUS, TRSDOS 6.x, CP/M available



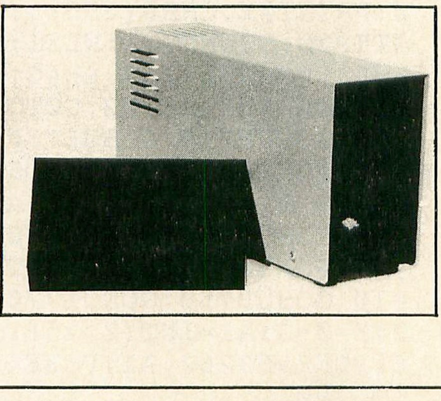


Fixed and Removeable PLUS + *SYSTEM*

Drive a 5 to 50 Megabyte Hard Bargain Starting at $449.95

Removeable Cartridge Systems Now Available!!!

Call Toll Free Ordering 1-800-343-8841



High Quality Lowest Price
Drive 0, 1, 2, 3
for the
Color Computer
Starting at $199.95

CANADIAN CUSTOMERS PLEASE CALL 514-383-5293

TERMS and CONDITIONS:
All prices are cash discounted. However, we do accept MC, VISA, AMEX & DISCOVER credit cards. Please inquire.
C.O.D.'s are accepted-No deposit required.
Purchase Orders-Corporate, Government & School P.O.'s are accepted. Please call for details.
Shipping Costs are calculated per order. Please call for total.
Shipments of all in-stock products are made within 24 hours, same day service is available upon request at no added cost.
Not responsible for typographical errors.

SOFTWARE SUPPORT, INC
1 Edgell Road
Framingham, MA 01701
1-617-872-9090
Hours: Mon.-Fri. 10 am to 5:30 pm (est) Sat 4:00 pm
Toll Free Ordering 1-800-343-8841
Dealer Inquiries Invited

Service & Returns: It is our policy to repair all service returns within 24-48 hours. Normally same day turn-a-round is accomplished. It is necessary to have a (R)eturn (M)aterial (A)uthorization to insure speedy service
IBM, TAVA, COLUMBIA, 5151, COMPAQ, EAGLE, TRS/80, HEATH/ZENITH are registered trademarks of IBM Corp., Tava Corp., Columbia Computer Corp., Key Tronics Corp, Compaq Corp, Eagle Computer, Tandy Corp, Zenith Corp, respectively.
© 1986 Software Support, Inc. *All rights reserved*

depositing points three or four higher in each succeeding position, until it reaches the top of the screen. Then, for the next cursor position, move the cursor to the bottom of the screen and repeat the same process.

Do this until you reach the last cursor position on the right. You have created a series of upward sloping lines. To be really fancy, make the top of each succeeding line several positions lower than the last one to create a trail-off effect. When you are finished creating the envelope, press any key to return to the menu.

Now try playing any selection still in memory. If there is no stored data, just play something from the compose mode. Try changing the tempo. Type in an envelope delay of 100. Press '1' at the menu and get into play mode. Play a few notes and then press the space bar. Now play the same notes over. Interesting!

A word about coherent values. While you can type in literally any envelope pattern wanted, the best ones follow a pattern. Each succeeding value should bear a rational relationship to its neighbors rather than being a random scattering of points. Maybe the points follow some sort of curve, or a pair of curves. Maybe every third point is offset from the curve by some fixed amount. The possibilities are endless, and when combined with various envelope delays and repeating patterns, quite a collection of different sounds can be created. Both envelope tables are programmable. An organ-like effect can be produced by using an envelope that is a straight horizontal line at the top of the screen.

For those interested in experimenting with sound, try a rational envelope

> ***"Each note is represented in memory as three data bytes."***

```
"B":RETURN
520 FORX=0 TO448STEP32
530 IFP=LP THENFORZ=X TO448STEP3
2:PRINTSTRING$(16,CHR$(175)):NEX
TZ:GOTO620
540 N=PEEK(S+3*P):IFN=255THENN$=
"PAU":PRINT@X,P:PRINT@X+5,N$:GOT
O570
550 IFN=100THENN$="env":L1=0:L2=
0:GOTO580
555 GOSUB560:GOTO570
560 O$=RIGHT$(STR$(INT((N-1)/12)
+2),1):Z=N-12*INT((N-1)/12):N$=N
$(Z):N$=O$+N$:RETURN
570 L1=PEEK(S+3*P+1):L2=PEEK(S+3
*P+2)
580 PRINT@X,P:PRINT@X+5,N$:IFN=1
00THEN600
590 PRINT@X+10,RIGHT$(STR$(L1),2
);L2
600 P=P+1
610 NEXT X
620 'EDIT MENU
630 PRINT@17,"1.PLAY SEGMENT":PR
INT@51,"TO CURSOR":PRINT@81,"2.P
LAY START":PRINT@115,"TO CURSOR"
:PRINT@145,"3.PLAY CURSOR":PRINT
@179,"TO END":PRINT@209,"4.NEW S
EGMENT":PRINT@241,"5.CHANGE NOTE
":PRINT@273,"6.INSERT NOTE":PRIN
T@305,"7.DELETE NOTE"
640 PRINT@337,"8.MAIN MENU":PRIN
T@369,"9.QUICK CHANGE":PRINT@403
,"TEMPO BYTES"
650 X=4:P=FS:CP=0
660 PRINT@X,CHR$(128);
670 A$=INKEY$:IFA$=""THEN670
680 IFA$=CHR$(94)OR A$=CHR$(10)T
HEN720
690 IFVAL(A$)<1OR VAL(A$)>9 THEN
670
700 ONVAL(A$)GOTO790,800,810,820
,845,948,980,710,1000
710 GOTO50
720 IFA$=CHR$(10)THEN740
730 IFX=4THEN670ELSEPRINT@X," ";
:X=X-32:CP=CP-1:GOTO660
740 IFX=452OR FS+CP+1=LP THEN670
ELSEPRINT@X," ";:X=X+32:CP=CP+1:
GOTO660
750 M1=PEEK(&H330D):M2=PEEK(&H33
0E):RETURN
760 A1=INT((S+3*FS)/256):A2=(S+3
*FS)-A1*256:RETURN
770 A1=INT((S+3*FS+3*(CP+1))/256
):A2=(S+3*FS+3*(CP+1))-A1*256:RE
TURN
780 EXEC&H325A:FORZ=1 TO300:NEXT
Z:PRINT@X,CHR$(255);:FORZ=1TO255
STEP20:SOUNDZ,1:NEXT:POKE&H3262,
&H33:POKE&H3263,&H4C:POKE&H330D,
M1:POKE&H330E,M2:GOTO660
790 GOSUB750:GOSUB760:POKE&H3262
,A1:POKE&H3263,A2:GOSUB770:POKE&
H330D,A1:POKE&H330E,A2:GOTO780
800 GOSUB750:GOSUB770:POKE&H330D
,A1:POKE&H330E,A2:GOTO780
810 GOSUB750:GOSUB770:Z=256*A1+A
2:Z=Z-3:A1=INT(Z/256):A2=Z-A1*25
6:POKE&H3262,A1:POKE&H3263,A2:GO
TO 780
820 CLS:PRINT"PLEASE TYPE POSITI
ON NUMBER FOR NEW SEGMENT":INPUT
Q
840 FS=Q:P=Q:GOTO520
845 GOSUB850:GOTO520
850 FOR Z=16TO464STEP32:PRINT@Z,
STRING$(15," "):NEXTZ:Z=S+3*FS+3
*CP:PRINT@17,"ENTER NEW NOTE":PR
INT@49,"ENTER TO EXIT":PRINT@81,
```

using very short delays (say 50) and a repeating pattern. Note that different keys vary in tonal quality as well as in pitch. The reason for this involves the interference patterns produced as the envelope delay gets nearer to the frequency delay (the delay used to produce the desired pitch). You may hear different "beat frequencies" with different keys.

Saving and Loading Compositions

Once you have composed and perfected the music, *PIANO/BAS* provides the means to save it on disk or tape. This is done from the menu and is self-prompting. It is saved with any altered envelope tables, envelope delay and play delay that are `POKE`d in while composing, so each composition has its own unique sound. You do not have to run the BASIC driver in order to play the music. Just `LOADM` or `CLOADM` whatever filename is used to store it. Then type `EXEC` and the piece plays.

If it needs further editing, run the BASIC driver and load the previously stored piece from the menu. Add to it, change the envelopes, the delays, or alter the note data and then resave the changes.

The Editor

We have done our best to confine the BASIC program in order to allow 16K owners to use the piano. The editor is simple, but adequate for manipulation of program data. It windows any 15-note segment of your composition, and allows replaying any part of that segment from the beginning to the cursor position.

Play something from the compose mode and press '9' at the main menu. The first column on the left is the note position. It starts at zero and increments for each note in the composition. The other columns represent actual note data. Each note is represented in memory as three data bytes. The second editor column translates the first data byte into an octave and a note. The third column contains the note length. These numbers go from one to 32; 32 is the longest note played. (If most of these numbers are less than 15, you might consider resetting the envelope delay to a smaller number and replaying the piece. That way, more of the envelope is heard during each keystroke.)

The last column is the pause interval that keeps track of the time between keystrokes. It is a number between one and 255. The higher the number, the longer the pause. This pause is not to be confused with the pauses intentionally placed in the data by pressing the ENTER key. Those pauses are stored just like any other note, with a note length and an interval pause.

The cursor can be moved up or down by pressing the appropriate arrow keys. Notes may be changed, inserted or deleted by positioning the cursor at the note position to be changed or deleted.

```
"";:INPUTN$
860 IFN$=""THENP=FS:RETURN
865 IF N$="ENV"THENPOKEZ,100:POK
EZ+1,0:POKEZ+2,0:RETURN
875 IF N$="PAU"THENPOKEZ,255:GOT
O930
890 PRINT@113,"OCTAVE?":PRINT@14
5,"";:INPUTO:IFO<2ORO>4THEN890EL
SEFORX=1 TO12:IFN$<>N$(X)THENNEX
TELSEN=(O-2)*12+X:POKEZ,N:GOTO93
0
892 IF N$="PAU"THENPOKEZ,255:GOT
O930
894 IF N$="ENV"THENPOKEZ,100:GOT
O930
900 GOTO845
930 PRINT@177,"NOTE LEN(1-32)":P
RINT@209,"";:INPUTN:IF N>32OR N<
1 THEN 930
935 POKEZ+1,N
940 PRINT@241,"PAUSE? (1-255)":P
RINT@273,"";:INPUTN:IFN<1ORN>255
THEN940
945 POKEZ+2,N:P=FS
947 RETURN
948 M=M+3:GOSUB950:GOTO960
950 PRINT@433,"thinking":M1=INT(
M/256):M2=M-M1*256:POKE&H330D,M1
:POKE&H330E,M2:RETURN
960 FOR Z=M TOS+3*FS+3*CP+1STEP-
1:A=PEEK(Z-1):POKEZ+2,A:NEXT
970 GOSUB850:LP=(M-S)/3:GOTO520
980 M=M-3:GOSUB950:FORZ=S+3*FS+3
*CP TOM+2:A=PEEK(Z+3):POKEZ,A:NE
XT:LP=(M-S)/3:GOTO520
```

```
1000 :CLS:PRINT"THIS OPTION CHAN
GES ALL NOTE     LENGHTS AND/OR P
AUASE BYTES      FROM BEGINING OF
 SEGMENT TO THE CURSOR":PRINT:PR
```

THE OTHER GUY'S Software

NEW FREE CATALOG

'KEEP-TRAK' General Ledger Reg. $69.95—ONLY $24.95

"Double-Entry" General Ledger Accounting System for home or business: 16k, 32k, 64k. User-friendly, menu-driven. Program features: balance sheet, income & expense statement (current & 'YTD'), journal, ledger, 899 accounts & 2350 entries on 32k & 64k (710 accounts & entries on 16k) (disk only). Version 1.2 has screen printouts. Rainbow Reviews 1.1 - 9/84 : 1.2-4/85

"OMEGA FILE" Reg. $69.95—ONLY $19.95

Filing data base. File any information with Omega File. Records can have up to 16 fields with 255 characters per field (4080 characters/record). Sort, match & print any field. User friendly menu driven. Manual included (32k/64k disk only). Rainbow Review 3/85, Hot CoCo 10/85

BOB'S MAGIC GRAPHIC MACHINE

Can generate BASIC code to use in your programs. Easy drawing and manipulation of circles, elipses, boxes, lines and ARCS. Single joystick operation with on line HELPS at all times. Allows text on the graphics screen & movement of objects on the screen. Can be used as a stand-alone graphics editor. Instruction Manual. **GRAPHICS EDITOR.Reg. $39.95—ONLY $19.95** for disk or tape. 64k ECB. Rainbow Review 7/85, Hot CoCo 9/85 **"The graphics bargain of the year"**

'KEEP-TRAK' Accounts Receivable. (Avail. 10/01/85).

Features: auto interest calculation, auto ageing of accounts, installment sales, total due sales, explanation space as long as you need, detailed statements, 'KEEP-TRAK' General Ledger tie in, account number checking, credit limit checking & more. User friendly/menu driven. Includes manual. **$39.95** or **$49.95** General Ledger & Accounts Receivables. (Disk Only).

'COCO WINDOWS' Available 10/31/85

With hi-res character display and window generator. Features an enhanced key board (klicks) and 10 programmable function keys. Allows the user to create multiple windows from basic. Includes menu driven printer setup and auto line numbering. Four function calculator. with memory. The above options can be called anytime while running or writing in BASIC. APPLE PULL YOUR DRAPES, YOU DON'T WANT TO SEE THIS. **$19.95** (disk or tape) includes manual.

CALL TOLL FREE

1-800-942-9402

VISA MasterCard

THE OTHER GUY'S SOFTware
P.O. Box H, 55 N. Main
Logan, UT 84321 (801) 753-7620

(Add $2.50 for postage & handling)
C.O.D., Money Order, Check in U.S. Funds
(Please specify if J&M controller)

Insertions occur at the cursor position, and the remainder of the composition is moved one position higher in memory. Inserting and deleting may take some time in long compositions since the entire data array above the cursor position must be relocated, and this relocation is done from BASIC.

Insert intentional pauses by typing PAU in place of a note. Pauses are like any note in that you must specify a note length and pause length. An envelope table switch may be inserted by typing ENV.

For the inexperienced piano players, we have included an option that allows the user to change both the note lengths and interval pauses en masse. Pressing '9' while in the editor allows you to specify numbers that are automatically inserted into all note positions from the top of the screen to the cursor position. Since any note position can be specified as the first note in each segment (the top of the screen), you can make large-scale changes in tempo or timing with reasonable precision.

Assembling PLAY Statements

Pressing '8' at the main menu causes the computer to build BASIC PLAY statements. These are assembled directly to disk or tape as a BASIC program complete with line numbers. Load them and type RUN to hear them. Those with disk drives can merge them into their own programs after adjusting the line numbers using Extended BASIC's RENUM function.

Line 5 is a tempo line. This line may be altered to speed up or slow down the playback. Since these are run from BASIC without the help of the ML synthesizer, envelope changes are ignored. (Actually, there is a way to get a "pseudo envelope" in BASIC. Those interested should contact Jeremy Spiller for information on how to obtain the program for this.) The PLAY statements offer another method of editing compositions as they can be manipulated using Extended BASIC's editing functions.

Tuning Your Piano

While we feel reasonably competent to write computer programs, neither of us play the piano, nor do we even know much about music. We tuned the piano by ear and if you can do better, give it a shot. The key table is located at &H3180. The assembly listing shows it from lines 16100 to 31300.

Look carefully at the assembly listing. Each key is represented by three bytes. The name of the key is commented to the right of its first byte. (Don't confuse these with the three data bytes stored in memory while composing. These begin at &H334C.) The first two bytes are the frequency delays and these account for the pitch of the key. The third byte is the note "name" and is the value stored in the first of the three data bytes while you are composing. The higher the frequency delay values, the lower the sound produced by that key. Note that in most cases, both delay values are the same. Keeping them equal or close to equal keeps the wave square.

The wave shape could be altered toward triangular by drastically reducing one while increasing the other. The wave doesn't have to be square. The delay values can be from one to 255. To sharpen the sound of a key, locate that key in the comment column of the key table and reduce the numbers in the frequency bytes. (The actual memory address is the hexadecimal number in the column farthest to the left in the assembly source code listing. As an example, to sharpen the sound produced by the BREAK key, POKE numbers lower than 52 into addresses &H3216 and/or &H3217.)

To lower the entire keyboard an octave, POKE higher numbers into the

```
INT"ENTER NOTE  LENGTH (1-32)
    <ENTER> TO LEAVE  UNCHANGED"
:INPUTA:IFA=0THEN1030ELSEIFA<1OR
A>32THEN1000
1010 FORZ=S+3*FS TOS+3*FS+3*CP S
TEP3:POKEZ+1,A:NEXT
1030 PRINT:PRINT"ENTER NOTE PAUS
E <ENTER> TO      ESCAPE":INPUTA:
IF A=0THEN520ELSEIFA<1OR A>255TH
EN1030
1040 FORZ=S+3*FS TOS+3*FS+3*CP S
TEP3:POKEZ+2,A:NEXT:GOTO520
8000 'PLAY STATEMENTS
8002 L=0:I=0:A=&H334C:E=PEEK(&H3
30D)*256+PEEK(&H330E):GOSUB510
8010 D=1:CLS:PRINT"PREPARE TAPE
RECORDER OR DISK   TO RECEIVE PL
AY STATEMENTS":PRINT:INPUT"FILEN
AME";F$:INPUT"(C)ASSETTE OR (D)I
SK";D$:IFD$="C"THENOPEN"O",#-1,F
$:D=-1:GOTO8012
8011 F$=F$+"/BAS":OPEN"O",#1,F$
8012 B$="5 PLAY"+CHR$(34)+"T6"+C
HR$(34):PRINT#D,B$
8014 L=L+10:L$=STR$(L):L$=RIGHT$
(L$,LEN(L$)-1):A$=L$+" PLAY"+CHR
$(34)
8020 FORX=A TOA+27STEP3:IFX=E TH
EN8100
8030 N=PEEK(X):IFN=255THEN8040EL
SEIFN=100THEN8160ELSEGOSUB560:N$
="O"+N$:IFRIGHT$(N$,1)="#"THENN$
=LEFT$(N$,LEN(N$)-1):N$=N$+"+"
8040 L1=PEEK(X+1):L2=PEEK(X+2):I
FL1=0THENL1=1:IFL2=0THENL2=1
8050 IF L1>16ANDL1<20THENL1=16EL
SE IF L1>19ANDL1<28THENL1=3:GOTO
8060
8055 L1=INT(1/(L1/32))
8060 IF L2>128ANDL2<160 THEN L2=
127 ELSEIFL2>127ANDL2<224 THEN L
2=3:GOTO8070
8065 L2=INT(1/(L2/255))
8070 L1$=STR$(L1):L2$=STR$(L2):L
1$=RIGHT$(L1$,LEN(L1$)-1):L2$=RI
GHT$(L2$,LEN(L2$)-1)
8075 IF N=255THEN8180
8080 N$="L"+L1$+N$+"P"+L2$
8090 A$=A$+N$:NEXTX
8100 A$=A$+CHR$(34):PRINT#D,A$:P
RINTA$
8114 IFX>=E THENCLOSE#D:GOTO50
8120 A=A+30:GOTO8014
8160 IFX=E THEN50ELSENEXTX
8180 N$="P"+L1$+"P"+L2$:GOTO8090
20000 PCLEAR1:GOTO10
```

frequency bytes of all the keys in the table. Do this by trial and error, sharpening or flattening each position until it sounds right. Once you get the table the way you want it, play a tune and save it as *PIANO/BIN*. Then, whenever you run the BASIC driver, it automatically loads the modified tables and becomes the new default. Have fun!

> ***"The editor is simple, but adequate . . ."***

Key Memory Addresses

&H3000	Execution address of play/compose segment.
&H325A	Execution address of playback segment.
&H330D and &H330E	LSB and MSB of address of last note played. POKE another address here to end playback at another note position.
&H334C	Address of first note of compositions.
&H3262 and H3263	Holds LSB and MSB of address of first note played (usually holds &H334C). POKE another address here to begin playback at another note.
&H3180	First byte of key table.
&H3219	First byte of envelope Table 1.
&H323A	First byte of envelope Table 2.
&H317E and &H317F	Holds top-of-RAM (&H7F80 in 32K systems).

(You may direct questions about this program to the authors at RFD 1, Box 504, Shirley, MA 01464, phone 617-448-2681. Please enclose an SASE when writing.) □

Listing 3: PIANO

```
3000               00100          ORG    $3000
3000 8D    11      00200 START    BSR    INITLZ
3002 7F    3178    00210          CLR    ENVTOG
3005 8E    3219    00500          LDX    #ENVTA1
3008 BF    3176    00600          STX    ENVTAB
300B 30    88 1F   00700          LEAX   +31,X
300E BF    317A    00800          STX    ENDTAB
3011 20    1B      00900          BRA    INKEY
3013 B6    FF01    01000 INITLZ   LDA    $FF01    INITIALIZE PIA'S
3016 84    F7      01100          ANDA   #$F7
3018 B7    FF01    01200          STA    $FF01
301B B6    FF03    01300          LDA    $FF03
301E 84    F7      01400          ANDA   #$F7
3020 B7    FF03    01500          STA    $FF03
3023 B6    FF23    01600          LDA    $FF23
3026 8A    08      01700          ORA    #8
3028 B7    FF23    01800          STA    $FF23
302B 1A    50      01900          ORCC   #$50
302D 39            02000          RTS
302E 1C    FE      02100 INKEY    ANDCC  #$FE     KEYBOARD POLLING
3030 BE    3176    02200          LDX    ENVTAB
3033 BF    3173    02300          STX    ENVPTR
3036 FE    317C    02400          LDU    ENVDLY
3039 86    FF      02500          LDA    #$FF
303B B7    FF02    02600          STA    $FF02
303E C6    FF      02700 IN010    LDB    #$FF
3040 5C            02800 IN020    INCB
3041 79    FF02    02900          ROL    $FF02
3044 B6    FF00    03000          LDA    $FF00
3047 8A    80      03100          ORA    #$80
3049 81    FF      03200          CMPA   #$FF
304B 26    06      03300          BNE    PRINT
304D C1    07      03400          CMPB   #7
304F 26    EF      03500          BNE    IN020
3051 20    DB      03600          BRA    INKEY
3053 34    04      03700 PRINT    PSHS   B
3055 B7    3175    03710          STA    KEYSTR
3058 C6    FF      03800          LDB    #$FF
305A 5C            03900 PRN020   INCB
305B 46            04000          RORA
305C 25    FC      04100          BCS    PRN020
305E 86    08      04200          LDA    #8
3060 3D            04300          MUL
3061 EB    E4      04400          ADDB   ,S
3063 35    02      04500          PULS   A
3065 C1    2F      04600          CMPB   #47      CHECK FOR ?/ KEY
3067 26    23      04700          BNE    SHIFT
3069 7C    3178    04800          INC    ENVTOG
306C B6    3178    04900          LDA    ENVTOG
306F 44            05000          LSRA
3070 25    0E      05100          BCS    ENV2
3072 8E    3219    05200 ENV1     LDX    #ENVTA1
3075 BF    3176    05300          STX    ENVTAB
3078 30    88 1F   05400          LEAX   +31,X
307B BF    317A    05500          STX    ENDTAB
307E 20    0C      05600          BRA    SHIFT
3080 8E    323A    05700 ENV2     LDX    #ENVTA2
3083 BF    3176    05800          STX    ENVTAB
3086 30    88 1F   05900          LEAX   +31,X
3089 BF    317A    06000          STX    ENDTAB
308C C1    37      06100 SHIFT    CMPB   #55      CHECK FOR SHIFT KEY
308E 1027  021E    06200          LBEQ   SWI
3092 108E  30A2    06300          LDY    #NOKEY
3096 E1    A0      06400 NOKEY1   CMPB   ,Y+
3098 27    94      06500          BEQ    INKEY
309A 108C  30AA    06600          CMPY   #NOKEY+8
309E 27    0A      06700          BEQ    PRN030
30A0 20    F4      06800          BRA    NOKEY1
30A2       01      06900 NOKEY    FCB    1        TABLE OF KEYS NOT PLAYED
30A3       06      07000          FCB    6
30A4       0B      07100          FCB    11
30A5       1C      07200          FCB    28
30A6       20      07300          FCB    32
30A7       23      07400          FCB    35
30A8       27      07500          FCB    39
30A9       37      07700          FCB    55
30AA C1    1F      07800 PRN030   CMPB   #31      CHECK FOR SPACEBAR
30AC 26    31      07900          BNE    ST001
30AE 7C    3179    08000          INC    TOGGLE
30B1 B6    FF00    08100 WAIT2    LDA    $FF00
30B4 8A    80      08110          ORA    #$80
```

UNIVERSAL VIDEO DRIVER

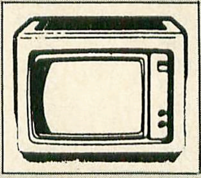
IT'S THE BEST!!!

Great Price! Only $29.95

Carefully engineered to work with ALL Color Computer models including the newest COCO II. Enables your COCO to operate with a video monitor instead of a television.

- Works with monochrome monitors!
- Works with color monitors!
- Audio Connection included!
- Easy installation—no soldering!

QUALITY VIDEO MONITORS



Sakata SC-100 - Streamlined 13″ composite monitor. Sharp, brilliant colors. With speaker and earphone jack. **$199.95**

CGS Amber Screen - High quality 12″ monitor. Attractive off-white cabinet with tilt/swivel base. **$119.95**

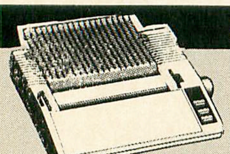
Zenith Amber - Excellent performance...Zenith quality. 12″ Screen. A Real Bargain. **$99.95**

Order a quality monitor from us and get a Universal Video Driver for only $24.95 — Save $5.00.

GRAFX SCREEN NEW!!

Versatile new screen dump software for your Star compatible printer. Print horizontal or vertical, image magnification, positive or negative and more! **5¼ Disc ONLY $14.95**

PRINTERS



NEW Star SG-10 model printer
120 cps w/true descenders,
2K buffer, proportional spacing.

FREE GRAFX SCREEN
Software with your printer.

star

ONLY $249.95

SERIAL TO PARALLEL PRINTER INTERFACE

300 to 9600 baud. Complete with all cables and connectors.

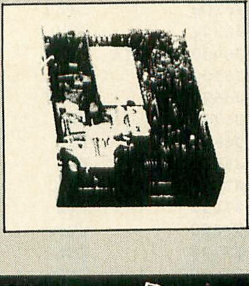
Only $49.95

NEED MORE MEMORY? 64K Memory Expansion Kit

All parts and complete intructions (for 'E' and 'F' boards and Coco II).

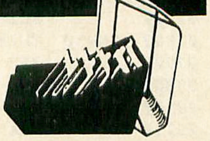
NOW ONLY $19.95

DISC DRIVES



Teac 55B DSDD Drive	**$119.95**
J&M JFD-CP Controller with DOS	**139.95**
Dual cabinet, power supply holds 2 horizontal 1/2 height drives	**79.95**
Drive one upgrade for new Tandy dual horizontal cabinet	**119.95**
Disc drive cable	**24.95**
Radio Shack DOS Rom 1.1 w/manual	**29.95**

SPECIAL DISC STORAGE

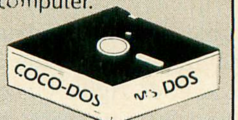


Attractive, heavy duty acrylic case with lock. Holds and protects 50 5¼″ discs with five moveable indexed dividers.

SUPER BARGAIN ONLY $9.95

Purchase this attractive storage case including 10 discs for $21.95.

COCO UTIL II — NEW VERSION



Transfer Coco disc files to your IBM compatible computer. You may also transfer MS-DOS files to a Color Computer disc. Save hours of retyping. Coco Util has been so popular we decided to make it even more powerful and versatile... extended directories, faster, improved menu selection system and more!

$39.95

Coco Util users upgrade to the new version for only $12.95 including shipping and handling.

PCX-II Computer

TOTAL IBM PC-XT COMPATIBILITY AT SENSATIONAL PRICES!!!

Starting at only $685.00

Don't settle for a Tandy 1000 or other standard PC until you check our performance and prices.

Hard Drive Systems	**As low as $520.00**
Hayes Compatible Modem 300/1200 baud	**189.95**
Color Graphic Board	**84.95**
Floppy Controller	**49.95**
IBM Compatible keybord	**From 69.95**
Multi-function board (1 serial port, 1 parallel port, 1 game port, real time clock, up to 384K).	**124.95**
Parallel printer cable	**24.95**
Serial printer cable	**24.95**
135 Watt IBM-type power supply	**99.95**
IBM PC-XT compatible mother board	**From 159.95**

We use and recommend the following excellent software.

DAC — complete accounting system for IBM compatibles. General ledger, receivables, payables, inventory.
An unbelievable bargain at ONLY $69.95.

DBASE III — Ashton Tate's powerful database management system.
ONLY $389.95

THE TWIN — Works exactly like Lotus 1-2-3. Excellent users manual.
An outstanding value ONLY $145.00

VP PLANNER — Another Great Lotus 1-2-3 Look Alike.
$89.95

FREE! Mark Data Products popular accounting system - with a PCX-II computer purchase.

IMPORTANT!

We maintain a library of quality public domain software for purchasers of our computer systems — text processor, data base manager, spread sheet, communication, utilities and entertainment software. Call for details.

FOR THE SERIOUS COCO USER

Accounting System - very popular ledger system for small businesses.	**$99.95 disk**
Order Entry - an excellent companion to the accounting system	**$99.95 disk**
Easy File - get organized with this user friendly data management system	**$59.95 disk**

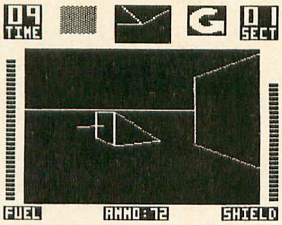
Super Screen - Best screen enhancement program available.
Cassette $29.95 Disk $32.95

DISCS • CASSETTES • ROMS

5¼″ discs, double density, reinforced hub w/sleeve, guaranteed.
$12.95 for 10 discs in an attractive storage box.

C-10 Cassettes w/labels	**10 for $5.50**
Cassette storage box	**10 for $2.00**
Basic 1.2 ROM	**$39.95**
Extended 1.1 ROM w/Manual	**$49.95**

CyberTank
© COPYRIGHT 1985, G. BOCHARDT



NEW! OUTSTANDING GRAPHICS'

Tired of flying wimpy airplanes???

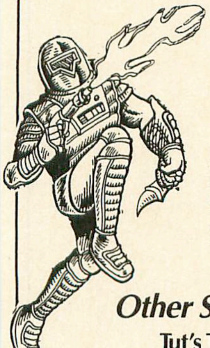
Want to try something macho for a change??

ORDER NOW! 64K Disk only. $27.95

CYBERTANK is a real-time tank simulation that will get your adrenalin flowing!

Your survival depends upon lightening-fast tactical decisions. Penetrate deep into enemy territory with powerful intelligence gathering devices and sophisticated armaments. Cannons, heat seeking missiles, flame throwers, pill boxes, battle tanks...

THIS ONE HAS IT ALL!!



SHOCK TROOPER

Welome Shock Trooper Squad Commander!

Intelligence has intercepted a coded message revealing a plan to conquer Earth. Four of your Shocktroopers must infiltrate the heavily defended underground enemy base and steal all of the secret TRG-5 attack saucer sub-assemblies.

Other Super Arcade Games:
Tut's Tomb
Time Fighter

Super Action

THE VORTEX FACTOR

The Sixth & Most Challenging of our Adventures

What is it? What secrets does it hold? The seeker of treasures through time and space must find out! From the Coliseum of ancient Rome to the futuristic world of tomorrow.

All games -
Cassettes $24.95
Discs $27.95
32K required.

By Bob Withers and Steve O'Dea

also available for IBM & Tandy 1000/1200

JOIN US IN THIS UNFORGETTABLE ODYSSEY.

OTHER EXCITING ADVENTURES

- Calixto Island
- Shenanigans
- Sea Search
- Trekboer
- Black Sanctum

FREE—Send for our free catalog flier.

MD Mark Data Products

24001 Alicia Pkwy., No. 207 • Mission Viejo, CA 92691
(714) 768-1551

SHIPPING: All orders under $100 please add $2 regular, $5 air. All orders over $100 please add 3% regular, 8% air. California residents please add 6% sales tax. Orders outside the continental U.S., check with us for shipping amount; please remit U.S. funds. Software authors—contact us for exciting program marketing details. We accept MasterCard and VISA, Distributed in Canada by Kelly Software.

```
30B6 81    FF        08200        CMPA    #$FF
30B8 26    F7        08300        BNE     WAIT2
30BA 16    FF71      08400        LBRA    INKEY
30BD B6    FF00      08500 WAIT   LDA     $FF00
30C0 8A    80        08510        ORA     #$80
30C2 81    FF        08600        CMPA    #$FF
30C4 26    F7        08700        BNE     WAIT
30C6 BE    330D      08800        LDX     MEMORY
30C9 86    20        08900        LDA     #32
30CB A7    01        09000        STA     +1,X
30CD 17    023F      09010        LBSR    TWEEN
30D0 E7    02        09020        STB     +2,X
30D2 30    03        09100        LEAX    +3,X
30D4 BF    330D      09200        STX     MEMORY
30D7 BC    317E      09300        CMPX    RAMEND
30DA 24    69        09400        BHS     RETURN
30DC 16    FF4F      09500        LBRA    INKEY
30DF C1    31        09600 ST001  CMPB    #49      CHECK FOR CLEAR
30E1 26    0F        09700        BNE     ST010
30E3 BE    330D      09800        LDX     MEMORY
30E6 30    1D        09900        LEAX    -3,X
30E8 8C    334C      10000        CMPX    #COMPOS
30EB 25    C4        10100        BLO     WAIT2
30ED BF    330D      10200        STX     MEMORY
30F0 20    BF        10500        BRA     WAIT2
30F2 8E    3180      10600 ST010  LDX     #TABLE
30F5 86    03        10700        LDA     #3
30F7 3D              10800        MUL
30F8 3A              10900        ABX
30F9 A6    02        11000        LDA     +2,X
30FB A7    9F 330D   11100        STA     [MEMORY]
30FF EC    84        11200        LDD     ,X
3101 34    06        11300        PSHS    A,B
3103 A6    9F 3173   11400 ST015  LDA     [ENVPTR]
3107 84    FC        11500        ANDA    #$FC
3109 E6    E4        11600        LDB     ,S
310B 8D    07        11700        BSR     SOUND
310D 4F              11800        CLRA
310E E6    61        11900        LDB     +1,S
3110 8D    02        12000        BSR     SOUND
3112 20    EF        12100        BRA     ST015
3114 5A              12200 SOUND  DECB
3115 26    2F        12300        BNE     ENVLOP
3117 8A    02        12310        ORA     #2
3119 B7    FF20      12400        STA     $FF20
311C B6    FF00      12500 QKKEY  LDA     $FF00    SEE IF KEY STILL PRESSED
311F 8A    80        12510        ORA     #$80
3121 B1    3175      12600        CMPA    KEYSTR
3124 27    1F        12700        BEQ     RETURN
3126 32    64        12800        LEAS    +4,S
3128 FC    3173      12900        LDD     ENVPTR
312B B3    3176      13000        SUBD    ENVTAB
312E BE    330D      13100        LDX     MEMORY
3131 E7    01        13200        STB     +1,X
3133 17    01D9      13210        LBSR    TWEEN
3136 E7    02        13220        STB     +2,X
3138 30    03        13230        LEAX    +3,X
313A BF    330D      13240        STX     MEMORY
313D BC    317E      13250        CMPX    RAMEND
3140 24    03        13260        BHS     RETURN
3142 16    FEE9      13500        LBRA    INKEY
3145 39              13600 RETURN RTS
3146 33    5F        13700 ENVLOP LEAU    -1,U     ENVELOPE COUNTDOWN
3148 1183  0000      13800        CMPU    #0
314C 26    C6        13900        BNE     SOUND
314E FE    317C      14000        LDU     ENVDLY
3151 BE    3173      14100        LDX     ENVPTR
3154 30    01        14200        LEAX    +1,X
3156 BC    317A      14300        CMPX    ENDTAB
3159 27    05        14400        BEQ     RESET
315B BF    3173      14500        STX     ENVPTR
315E 20    B4        14600        BRA     SOUND
3160 B6    3179      14700 RESET  LDA     TOGGLE
3163 44              14800        LSRA
3164 25    05        14900        BCS     CONTIN
3166 32    64        15000        LEAS    +4,S
3168 16    FF52      15100        LBRA    WAIT
316B BE    3176      15200 CONTIN LDX     ENVTAB
316E BF    3173      15300        STX     ENVPTR
3171 20    A1        15400        BRA     SOUND
3173       0000      15500 ENVPTR FDB     0        POINTS TO CURRENT ENV VALU
3175       00        15510 KEYSTR FCB     0        STORES CURRENT VAL OF FF00
3176       0000      15600 ENVTAB FDB     0        POINTS TO CURRENT ENV TABLE
3178       00        15700 ENVTOG FCB     0        ENV TABLE TOGGLE BYTE
3179       00        15800 TOGGLE FCB     0        REPEATING ENV TOGGLE BYTE
317A       0000      15900 ENDTAB FDB     0        POINTS TO END CURRENT ENV TAB
317C       044C      16000 ENVDLY FDB     1100     ENVELOPE DELAY
317E       7FFF      16050 RAMEND FDB     $7FFF    POINTS TO TOP OF RAM
3180       3F        16100 TABLE  FCB     63       @ FIRST BYTE KEY TAB
3181       3F        16200        FCB     63
3182       14        16300        FCB     20
3183       01        16400        FCB     1        A
3184       01        16500        FCB     1
3185       80        16600        FCB     128
3186       1F        16700        FCB     31       B
3187       1F        16800        FCB     31
3188       20        16900        FCB     32
3189       25        17000        FCB     37       C
318A       25        17100        FCB     37
318B       1D        17200        FCB     29
318C       27        17300        FCB     39       D
318D       28        17400        FCB     40
318E       1C        17500        FCB     28
318F       90        17600        FCB     144      E
3190       90        17700        FCB     144
3191       06        17800        FCB     6
3192       01        17900        FCB     1        F
3193       01        18000        FCB     1
3194       80        18100        FCB     128
3195       20        18200        FCB     32       G
3196       21        18300        FCB     33
3197       1F        18400        FCB     31
```

```
3198     1D       18500           FCB     29      H
3199     1E       18600           FCB     30
319A     21       18700           FCB     33
319B     53       18800           FCB     83      I
319C     53       18900           FCB     83
319D     0F       19000           FCB     15
319E     1A       19100           FCB     26      J
319F     1B       19200           FCB     27
31A0     23       19300           FCB     35
31A1     01       19400           FCB     1       K
31A2     01       19500           FCB     1
31A3     80       19600           FCB     128
31A4     15       19700           FCB     21      L
31A5     16       19800           FCB     22
31A6     26       19900           FCB     38
31A7     19       20000           FCB     25      M
31A8     19       20100           FCB     25
31A9     24       20200           FCB     36
31AA     1C       20300           FCB     28      N
31AB     1C       20400           FCB     28
31AC     22       20500           FCB     34
31AD     4B       20600           FCB     75      O
31AE     4B       20700           FCB     75
31AF     11       20800           FCB     17
31B0     47       20900           FCB     71      P
31B1     47       21000           FCB     71
31B2     12       21100           FCB     18
31B3     AC       21200           FCB     172     Q
31B4     AC       21300           FCB     172
31B5     03       21400           FCB     3
31B6     80       21500           FCB     128     R
31B7     80       21600           FCB     128
31B8     08       21700           FCB     8
31B9     2D       21800           FCB     45      S
31BA     2D       21900           FCB     45
31BB     1A       22000           FCB     26
31BC     71       22100           FCB     113     T
31BD     71       22200           FCB     113
31BE     0A       22300           FCB     10
31BF     5E       22400           FCB     94      U
31C0     5E       22500           FCB     94
31C1     0D       22600           FCB     13
31C2     22       22700           FCB     34      V
31C3     22       22800           FCB     34
31C4     1E       22900           FCB     30
31C5     98       23000           FCB     152     W
31C6     98       23100           FCB     152
31C7     05       23200           FCB     5
31C8     2A       23300           FCB     42      X
31C9     2A       23400           FCB     42
31CA     1B       23500           FCB     27
31CB     65       23600           FCB     101     Y
31CC     65       23700           FCB     101
31CD     0C       23800           FCB     12
```

```
31CE     30       23900           FCB     48      Z
31CF     2F       24000           FCB     47
31D0     19       24100           FCB     25
31D1     C1       24200           FCB     193     UP ARR
31D2     C1       24300           FCB     193
31D3     01       24400           FCB     1
31D4     01       24500           FCB     1       DN ARR
31D5     01       24600           FCB     1
31D6     80       24700           FCB     128
31D7     37       24800           FCB     55      LT ARR
31D8     39       24900           FCB     57
31D9     16       25000           FCB     22
31DA     31       25100           FCB     49      RT ARR
31DB     31       25200           FCB     49
31DC     18       25300           FCB     24
31DD     00       25400           FCB     0       SPACE
31DE     00       25500           FCB     0
31DF     00       25600           FCB     0
31E0     01       25700           FCB     1       0
31E1     01       25800           FCB     1
31E2     80       25900           FCB     128
31E3     B6       26000           FCB     182     1
31E4     B7       26100           FCB     183
31E5     02       26200           FCB     2
31E6     A2       26300           FCB     162     2
31E7     A2       26400           FCB     162
31E8     04       26500           FCB     4
31E9     01       26600           FCB     1       3
31EA     01       26700           FCB     1
31EB     80       26800           FCB     128
31EC     88       26900           FCB     136     4
31ED     88       27000           FCB     136
31EE     07       27100           FCB     7
31EF     78       27200           FCB     120     5
31F0     79       27300           FCB     121
31F1     09       27400           FCB     9
31F2     6B       27500           FCB     107     6
31F3     6B       27600           FCB     107
31F4     0B       27700           FCB     11
31F5     01       27800           FCB     1       7
31F6     01       27900           FCB     1
31F7     80       28000           FCB     128
31F8     58       28100           FCB     88      8
31F9     59       28200           FCB     89
31FA     0E       28300           FCB     14
31FB     4F       28400           FCB     79      9
31FC     4F       28500           FCB     79
31FD     10       28600           FCB     16
31FE     43       28700           FCB     67      *
31FF     43       28800           FCB     67
3200     13       28900           FCB     19
3201     13       29000           FCB     19      +
3202     13       29100           FCB     19
3203     28       29200           FCB     40
3204     17       29300           FCB     23      <
3205     17       29400           FCB     23
3206     25       29500           FCB     37
3207     3B       29600           FCB     59      -
3208     3B       29700           FCB     59
3209     15       29800           FCB     21
320A     14       29900           FCB     20      >
320B     14       30000           FCB     20
320C     27       30100           FCB     39
320D     01       30200           FCB     1       ?
320E     01       30300           FCB     1
320F     64       30400           FCB     100
3210     05       30500           FCB     5       ENTER
3211     05       30600           FCB     5
3212     FF       30700           FCB     255
3213     01       30800           FCB     1       CLEAR
3214     01       30900           FCB     1
3215     64       31000           FCB     100
3216     34       31100           FCB     52      BREAK
3217     34       31200           FCB     52
3218     17       31300           FCB     23
3219     FF       31400  ENVTA1   FCB     255     ENVELOPE TABLE #1
321A     CA       31500           FCB     202
321B     AA       31600           FCB     170
321C     91       31700           FCB     145
321D     7E       31800           FCB     126
321E     6B       31900           FCB     107
321F     5B       32000           FCB     91
3220     50       32100           FCB     80
3221     46       32200           FCB     70
3222     3D       32300           FCB     61
3223     35       32400           FCB     53
3224     2D       32500           FCB     45
3225     28       32600           FCB     40
3226     22       32700           FCB     34
3227     1D       32800           FCB     29
3228     1A       32900           FCB     26
3229     17       33000           FCB     23
322A     15       33100           FCB     21
322B     12       33200           FCB     18
322C     10       33300           FCB     16
322D     0F       33400           FCB     15
322E     0D       33500           FCB     13
322F     0C       33600           FCB     12
3230     0A       33700           FCB     10
3231     09       33800           FCB     9
3232     08       33900           FCB     8
3233     07       34000           FCB     7
3234     06       34100           FCB     6
3235     05       34200           FCB     5
3236     04       34300           FCB     4
3237     03       34400           FCB     3
3238     02       34500           FCB     2
3239     01       34600           FCB     1
323A     FF       34700  ENVTA2   FCB     255     ENVELOPE TABLE #2
323B     89       34800           FCB     137
```

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

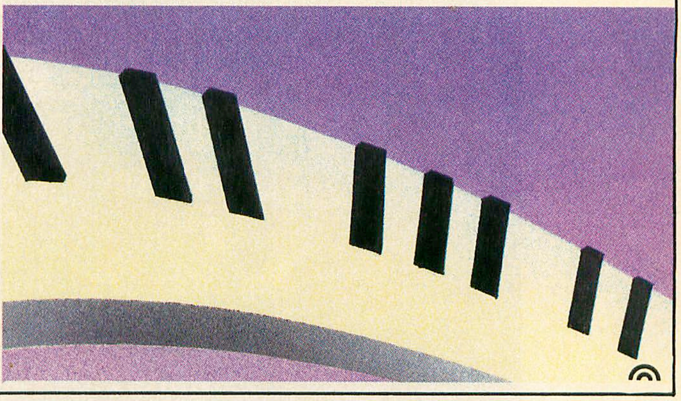
Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette) to:

THE RAINBOW One-Liner Contest
P.O. Box 385
Prospect, KY 40059

```
323C      44       34900                FCB   68
323D      04       35000                FCB   4
323E      E6       35100                FCB   230
323F      95       35200                FCB   149
3240      41       35300                FCB   65
3241      04       35400                FCB   4
3242      D2       35500                FCB   210
3243      91       35600                FCB   145
3244      41       35700                FCB   65
3245      04       35800                FCB   4
3246      C0       35900                FCB   192
3247      79       36000                FCB   121
3248      41       36100                FCB   65
3249      04       36200                FCB   4
324A      AD       36300                FCB   173
324B      70       36400                FCB   112
324C      34       36500                FCB   52
324D      04       36600                FCB   4
324E      9A       36700                FCB   154
324F      63       36800                FCB   99
3250      2C       36900                FCB   44
3251      04       37000                FCB   4
3252      86       37100                FCB   134
3253      54       37200                FCB   84
3254      29       37300                FCB   41
3255      04       37400                FCB   4
3256      74       37500                FCB   116
3257      48       37600                FCB   72
3258      22       37700                FCB   34
3259      00       37800                FCB   0
325A 17   FDB6     37900  PLAYBK  LBSR  INITLZ    PLAYBACK SEGMENT
325D 7F   3178     37910          CLR   ENVTOG
3260 108E 334C     38000          LDY   #COMPOS
3264 8E   3219     38100          LDX   #ENVTA1
3267 BF   3176     38200          STX   ENVTAB
326A FE   317C     38300  PLY005  LDU   ENVDLY
326D BE   3176     38400          LDX   ENVTAB
3270 BF   3173     38500          STX   ENVPTR
3273 10BC 330D     38600  PLY010  CMPY  MEMORY
3277 27   37       38700          BEQ   SWI
3279 E6   21       38800          LDB   +1,Y
327B BE   3176     38900          LDX   ENVTAB
327E 3A            39000          ABX
327F BF   32B1     39100          STX   ENVPT2
3282 E6   A4       39200          LDB   ,Y
3284 8E   3180     39300          LDX   #TABLE
3287 C1   64       39400          CMPB  #100
3289 26   1D       39510          BNE   PLY020
328B 7C   3178     39520          INC   ENVTOG
328E B6   3178     39530          LDA   ENVTOG
3291 44            39540          LSRA
3292 25   0A       39550          BCS   ENV22
3294 8E   3219     39560          LDX   #ENVTA1
3297 BF   3176     39900          STX   ENVTAB
329A 31   23       40000          LEAY  +3,Y
329C 20   CC       40100          BRA   PLY005
329E 8E   323A     40200  ENV22   LDX   #ENVTA2
32A1 BF   3176     40300          STX   ENVTAB
32A4 31   23       40400          LEAY  +3,Y
32A6 20   C2       40500          BRA   PLY005
32A8 E1   02       40600  PLY020  CMPB  +2,X
32AA 27   07       40700          BEQ   FOUND
32AC 30   03       40800          LEAX  +3,X
32AE 20   F8       40900          BRA   PLY020
32B0 39            41000  SWI     RTS
32B1      0000     41100  ENVPT2  FDB   0
32B3 EC   84       41200  FOUND   LDD   ,X
32B5 34   06       41300          PSHS  A,B
32B7 A6   9F 3173  41400  PLY030  LDA   [ENVPTR]
32BB E6   A4       41500          LDB   ,Y
32BD C1   FF       41600          CMPB  #255
32BF 26   01       41700          BNE   PLY040
32C1 4F            41800          CLRA
32C2 E6   E4       41900  PLY040  LDB   ,S
32C4 8D   07       42000          BSR   SND
32C6 4F            42100          CLRA
32C7 E6   61       42200          LDB   +1,S
32C9 8D   02       42300          BSR   SND
32CB 20   EA       42400          BRA   PLY030
32CD 5A            42500  SND     DECB
32CE 26   28       42600          BNE   ENV
32D0 8A   02       42610          ORA   #2
32D2 B7   FF20     42700          STA   $FF20
32D5 BE   3173     42800  CKSTOP  LDX   ENVPTR
32D8 BC   32B1     42900          CMPX  ENVPT2
32DB 1023 FE66     43000          LBLS  RETURN
32DF 8D   55       43002          BSR   BETWN
32E1 CE   0032     43010          LDU   #50       <-<PLAYDELAY
32E4 33   5F       43020  PLYDLY  LEAU  -1,U
32E6 1183 0000     43030          CMPU  #0
32EA 26   F8       43040          BNE   PLYDLY
32EC 30   01       43100          LEAX  +1,X
32EE BF   3173     43200          STX   ENVPTR
32F1 32   64       43300          LEAS  +4,S
32F3 31   23       43400          LEAY  +3,Y
32F5 16   FF72     43500          LBRA  PLY005
32F8 33   5F       43600  ENV     LEAU  -1,U
32FA 1183 0000     43700          CMPU  #0
32FE 26   CD       43800          BNE   SND
3300 FE   317C     43900          LDU   ENVDLY
3303 BE   3173     44000          LDX   ENVPTR
3306 30   01       44100          LEAX  +1,X
3308 BF   3173     44200          STX   ENVPTR
330B 20   C0       44300          BRA   SND
330D      334A     44400  MEMORY  FDB   $334A     POINTS TO LAST NOTE STORED
330F C6   01       44450  TWEEN   LDB   #1
3311 7F   FF02     44500          CLR   $FF02
3314 B6   FF00     44600  TWEEN0  LDA   $FF00
3317 8A   80       44610          ORA   #$80
```

```
3319 81   FF       44700          CMPA  #$FF
331B 1026 FE26     44800          LBNE  RETURN
331F 4F            44900          CLRA
3320 1021 FD0A     44910  TWEEN3  LBRN  INKEY
3324 1021 FD06     44920          LBRN  INKEY
3328 4C            45000          INCA
3329 27   02       45100          BEQ   TWEEN4
332B 20   F3       45200          BRA   TWEEN3
332D 5C            45300  TWEEN4  INCB
332E C1   FF       45400          CMPB  #$FF
3330 1027 FE11     45500          LBEQ  RETURN
3334 20   DE       45600          BRA   TWEEN0
3336 5F            45700  BETWN   CLRB
3337 4F            45800  BETWN1  CLRA
3338 1021 FCF2     45900  BETWN2  LBRN  INKEY
333C 1021 FCEE     46000          LBRN  INKEY
3340 4C            46100          INCA
3341 26   F5       46200          BNE   BETWN2
3343 5C            46300          INCB
3344 E1   22       46400          CMPB  +2,Y
3346 1027 FF66     46500          LBEQ  SWI
334A 20   EB       46600          BRA   BETWN1
334C      00       46700  COMPOS  FCB   0         FIRST BYTE STORED MUSIC DATA
          325A     46800          END   PLAYBK

00000 TOTAL ERRORS
```



Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submissions Editor, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

Files
View
Disk
?
Data Directory
File1
Datafile
Budget
April85
Friends
Bulletin
Kidstuff
Resumes
Year1985
Compusrv
DowJones
Picture1
May85
Recipes
Entrpriz
1
2
3

DeskMate® 7-in-1 software makes your Color Computer better than ever.

Now our popular Deskmate® software is available for disk-based Color Computers! DeskMate (26-3259, $99.95) features seven popular personal-productivity programs—all on one disk!

A general-purpose *TEXT* entry and editing program performs search and replace, file merge and block select, copy and delete. It's ideal for writing correction-free letters, memos and short reports.

A simple spreadsheet program includes an easy-to-use menu and automatic column formatting. You can use *LEDGER* to do budgeting, sales forecasting, profit-and-loss projections and other "What if . . .?" calculations.

LEDGER

A four-color picture editor lets you create lines, shapes, patterns, fills in areas with color and enter text. Using *PAINT,* you can create colorful charts, graphs, designs and "doodles" on your screen, then print a copy on a dot-matrix or ink-jet printer.

The *INDEX CARDS* personal filing system lets you enter and edit data and perform simple sorts and searches. It's ideal for keeping track of names and addresses.

INDEX CARDS

TELECOM

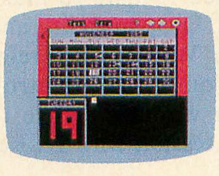
TELECOM, a communications program lets you access national information services, plus transmit and receive files from other computers by phone (requires modem).

A simple monthly calendar program displays "to do's" for any date. *CALENDAR* is an easy way to organize your work day.

TEXT EDITOR

A four-function *CALCULATOR,* with memory, is also available within any application without interrupting the screen in the program you are currently using.

If you don't already have a disk drive for your color computer, you can add one for just $299 (26-3131). The 5¹/₄", thinline floppy drive plugs into your Program Pak® port for over 156,000 characters of storage. Add a second drive at any time, too.



CALENDAR

Radio Shack®

The Technology Store™

A DIVISION OF TANDY CORPORATION

Free! New 1986 Software Guide RSC-16.

Mail to: Radio Shack
Dept. 86-A-099, 300 One Tandy Center
Fort Worth, Texas 76102

Name ______________________

Address ______________________

City ______________________

State ____________ ZIP ____________

Phone ______________________

Price applies at Radio Shack Computer Centers and participating stores and dealers. DeskMate/Registered TM Tandy Corp.

Enhance Presentations with Text Panel Formatting

By Joseph Kolar
Rainbow Contributing Editor

Now hear this! I have developed 20 tutorials using Hi-Res graphics for the 16K ECB CoCo. Before presenting this 20-month series, I invite all interested readers to make their wishes known. Drop me a line and register your vote. Would you prefer that we continue our leisurely stroll through BASIC? Or would you like to settle in for a long session with Hi-Res graphics?

Our agenda for today is the text screen and how to format text panels in an interesting manner to enhance their presentation.

In many educational programs, text must be used extensively to explain or develop a theme. It behooves the novice programmer to make the text on the screen as appealing as possible. About two years ago, I presented a tutorial on this subject. To the newer readers of this column, what you learn here will stand you in good stead.

Hint for today. When keying in program lines, look at the TV/monitor screen and watch the characters appear as they are typed in rather than looking at your fingers. You will find that typing errors can be spotted as they are committed and can be corrected before completing the program line. There are two advantages to this: You will gradually develop a touch-typing system as you are weaned from being mesmerized by the keyboard and it eliminates a lot of errors before pressing ENTER.

When the program is run it may not produce an error message. It may carry an embarrassing misspelling in an otherwise impeccable program. When it is discovered, creative time is wasted searching out the right program line, correcting it and running the program to verify the correction. It is difficult enough to program without the bother of debugging silly spelling errors.

The veterans may want to skip Listing 1 and Listing 2 because they are old hat. Newcomers, key in Listing 1, carefully typing in the lines as they appear in the listing. Run the program. Press any key to advance. Faithfully follow the instructions. Perform all actions called for enclosed in brackets. If you skip over parts of the text/instructions, you will not get the entire picture.

Once this tutorial is completed, Line 2000 is altered. Refer to the listing and restore the line to its original condition.

In the educational program that we are going to develop in the next few months, we will be doing a lot of programming directly from the screen. Understanding how to format text and position a sentence(s) on the screen so it doesn't look disjointed or unbalanced is important. It's imperative that you practice programming sentences to make neat, well-placed text for display on the screen or you may encounter trouble later.

Long `REM` statements in a listing should be formatted with a different view in mind. `REM` statements are dormant during the execution of a program. When they are revealed in the course of listing a program, they must be neat, logical and readable just as text lines on the screen.

Forget the "invisible vertical line" gambit. Look at the screen and compose, alter and adjust the `REM` statement lines so they are instantly recognizable and readable.

Key in Listing 2. When finished, list it line by line, beginning with 3000 through 3080. The listing is the tutorial! Those who know how, may want to append Listing 2 to Listing 1.

Listing 3 is practically one giant

Florida-based Joseph Kolar is a veteran writer and programmer and specializes in introducing beginners to the powers of CoCo.

GOSUB program. It could have been divided further, but after a point too many GOSUBs can be counterproductive. Aside from the usual one-panel-at-a-time presentation of text on the screen, we will demonstrate scrolling, simple substitution and complex substitution methods.

Key in Listing 3. Line 10 demonstrates the usual panel replacement method (Lines 100-101, 110-111, 120 and 122).

The panels of text must be carefully crafted to fit in the available screen space. This means the contents of each panel may have to be revised. (Add a few words or delete a few words.)

Beginning with Line 123 and continuing through Line 128, the program changes to the scrolling method. Each set of definitions is scrolled upwards. Note that each set covers about one-half of the screen rows to maintain a nice, two-set display at all times.

The columns in each set created were based on one of the techniques in a tutorial we discussed a few months ago. It should be familiar, so we won't beat it to death. Here is a question to ponder — Why are there four commas after "red" in Line 123 rather than three commas after "English" in Line 122?

The languages in column one are Germanic and those in column two are Romance. It is easy to spot the similarities in the words in the two columns. Examine the "black" set. The three Germanic definitions are very closely related, as are the three Romance ones. They are called cognates; words that are linguistically related and that may have a common origin. The obsolete English word for "black" is "swart," which exists today in "swarthy." The progenitor of the Romance languages is Latin, while that of the Germanic trio is a hypothetical proto-Germanic language. "Black" is related to an old Anglo-Saxon form of unknown origin.

The simple substitution method can be observed in the text presentation in lines 20 and 30. Here the panel remains in place. The definitions are replaced simultaneously as one unit. Line 120, on the top half of the screen, briefly comments on the word lists to be depicted.

The bottom half of the display panel uses the same group of GOSUBs that were used in Line 10 to create the combo panel replacement and scrolling method. Note that in Line 20, PRINT@ ,255,"" becomes GOSUB200 in Line 30.

In order to utilize the same GOSUBs, we decided to print "nothing" in the last space on the right-hand side of the row above our starting row (beginning at space 256). The idea is to maintain the integrity of GOSUBs 122 through 128 and to maintain the same vertical location at all times. Also, the text on the top half of the screen is not partially scrolled up and off the screen. The PRINT@ allows us to designate the location of a GOSUB statement without altering its contents, which ends it effectively as a GOSUB.

Change the first 255 in Line 20 to 256 and you see how it ruins an effect we tried hard to achieve.

Line 40 uses the complex-substitution method. If you want sound, turn up the volume.

Line 300 sets the values for the location of the seven entries that will be substituted, one at a time, in each set. X$ is used as a blanking-out string variable.

Line 301 sets up the abbreviations that will remain in place throughout this program segment.

Line 303 locates and prints the "red" set. Between each PRINT@ word, there appears a slight pause and a sound, courtesy of GOSUB400. Note the ';' after the entries that contain 'B', 'D' and 'F'. They are required after the left-hand column. If they are omitted, the right-hand column is wiped out, losing the abbreviations that were meant to remain undisturbed.

Line 305 blanks out the definitions and pauses for two seconds.

Note that lines 303 and 310 end with `EXEC44539:GOSUB305:RETURN`. It waits for a key to be pressed, blanks out the definitions and returns. The temptation was too great to resist. A GOSUB500 was created to continue this program.

Line 99 was a temporary stop that became dormant once the program, (lines 10 through 40) was finished and a loop to repeat (Line 50) was added.

Line 399 ends the program abruptly and keeps the sound (GOSUB400) separated from the complex substitution segment. Delete or mask Line 399 with a REM and see what happens!

After CoCo runs through the complex substitution sets, instead of coming to the intended screeching halt, it goes berserk and makes three ever-decreasing loops encompassing white-yellow-green, yellow-green and green, before going back to the start of the program.

Obviously, CoCo is innocent. There is a hidden semi-error in the listing that is suppressed when 399 GOTO 399 is used. Guess who made the error. Can you track it down and save my day?

TRON and TROFF, the debugging aids, are often both useless and confusing in a large program. Listing 3 is ideally suited to try out the TRON feature of ECB.

Press BREAK, type in TRON, press ENTER and RUN. You'd think this program was made to order to demonstrate TRON. Each number enclosed in square brackets gives the program line number that is executed.

> ***"If it works, don't fool with it!"***

If you follow it slowly, you will be able to determine at what point I caused CoCo to veer from the straight and narrow. It will nudge you toward the error(s). Put on your thinking cap and locate the mistake(s).

Sometimes, as happened in this program, it is possible to create a viable program with a submerged, latent error that is not readily apparent. If this program is enlarged and altered to head in a new direction, the error can surface and force you to cope with it. My motto is, "If it works, don't fool with it!"

With the TRON on, note that lines 10 through 40 are not displayed. Rather, all the GOSUBs are nicely labeled. Lines 200, 300, 301 and 400, which remain set at some point in the program, are in a stationary location. This is particularly obvious in the complex substitution segment.

Program lines that do nothing are not noted, such as locations that are not executed. Only that which is in the location is executed.

Work through Listing 3 with TRON and compare each bracketed number with the listing line number. You will find it helpful and enjoyable to romp through the program with CoCo. If you find the mistake, good. If not, have fun exploring this debugging tool anyway, and when finished, remember to pluck the REM out of Line 399 and get out of TRON mode with BREAK, TROFF and ENTER.

Everytime you turn on CoCo and program, you are having a learning experience. Enjoy it! ☐

Listing 1: TUTOR 1

```
0 '<LISTING1>
10 CLS:GOSUB2000
11 '<RUN> THIS AND SEE HOW ODD I
T LOOKS!
12 EXEC44539:PRINT"  NOTE THE ST
ARTING SPACE IN THESECOND LINE O
F TEXT!
13 EXEC44539:PRINT:PRINT"  NOTE
HOW 'THAT' IS SPLIT ONTO TWO LIN
ES!"
14 EXEC44539:PRINT:PRINT"  <BREA
K> <LIST2000>  STUDY THE DISPLAY
!  WHAT MUST BE DONE TO  MOVE TH
E SECOND LINE ONE SPACE  TO THE
LEFT?  WHEN READY <RUN15><PRESS
ANY KEY>"
15 EXEC44539:GOSUB2000:
16 EXEC44539:PRINT"  WE MUST DEL
ETE THE BLANK SPACEAT THE BEGINN
ING OF THE SECOND  LINE BETWEEN
THE WORDS 'TEXT'  AND 'IN'.  DO
 SO NOW!  <BREAK>  <EDIT2000> <4
2> <SPACEBAR> <D>  <ENTER> <RUN1
8> <PRESS A KEY>."
18 EXEC44539:GOSUB2000:PRINT:PRI
NT"  NOTE 'THA' OF 'THAT' MUST B
E  MOVED TO THE NEXT LINE.  <BRE
AK><EDIT2000> AND INSERT THREE
   SPACES SO THAT 'THA' IS PUSHE
D  TO THE NEXT LINE.  <71> <SPAC
E- BAR> <I> <SPACEBAR (3 TIMES)>
"
19 PRINT"<ENTER> <RUN20> <PRESS
KEY>.
20 EXEC44539:GOSUB2000:PRINT"  N
OTE THAT THE LEFT MARGIN BE- GIN
S VERTICALLY WITH A BLANK    SPA
CE;I;T.  <BREAK> <LIST2000>  AND
 NOTE WHERE THIS SEQUENCE OF LET
TERS FALL. <RUN21> <PRESS>.
21 EXEC44539:GOSUB2000:PRINT"  I
F YOU DREW AN INVISIBLE,     VER
TICAL LINE YOU WOULD NOTE    THA
T THIS FIRST COLUMN OF CHAR- ACT
ERS/SPACES FELL IMMEDIATELY  TO
THE RIGHT OF THE STARTING    'QU
OTE MARK'."
22 EXEC44539:GOSUB2000:PRINT"  N
OW YOU KNOW WHERE TO BEGIN   EAC
H LINE OF TEXT AS YOU ARE    KEY
ING IT IN.  IF A WORD MUST BEBRO
KEN UP INTO SYLLABLES, THE   TEC
HNIQUE IS THE SAME."
23 PRINT"  TO SEE HOW LINE22, (A
BOVE    PARAGRAPH), WAS ALLIGNE
D <BREAK><LIST22> SEE THE INVISI
BLE LINE AFTER THE STARTING QUOT
E MARK?  <RUN24> <PRESS A KEY>"
24 EXEC44539:PRINT"  SPACE;E;K;B
;T":PRINT:PRINT"  NO MATTER WHER
E THE START OF  THE TEXT LINE BE
GINS IN A ROW,  THE INVISIBLE LI
NE BEGINS RIGHT AFTER THE OPENIN
G QUOTE MARK OF THAT PARTICULAR
SENTENCE. "
25 EXEC44539:CLS:PRINT:PRINT"  R
EMEMBER THAT THAT OPENING    QUO
TE MARK IS THE VISUAL HINT ONTHE
 SCREEN, AS YOU KEY IN A PRO-GRA
M LINE.  IT ALERTS YOU WHEN  YOU
 ARE REACHING THE END OF A   TEX
T LINE OF 32 CHARACTERS/SPACES."
26 PRINT:PRINT"  THE RIGHT-MARGI
N WILL BE DI-  RECTLY UNDER THE
OPENING QUOTE  MARK.  ANY WORD T
HAT EXTENDS    PAST THE 32ND, RI
GHT MARGIN     SPACE, WILL HAVE
TO BE ADJUSTED,IN WHOLE OR IN PA
RT!"
27 EXEC44539:PRINT:PRINT"  IF TH
E ENTIRE WORD MUST BE     PLACED
ON THE NEXT LINE, THE     SPACES
BETWEEN THE LAST FULL     WORD AT
 THE END OF THE ROW AND  THE 1ST
 SPACE OF THE NEXT ROW,  WHERE T
HE IST LETTER OF THE NEXTWORD WI
LL BEGIN, MUST BE FILLED"
28 PRINT"WITH BLANK 'SPACES'.
29 EXEC44539:PRINT:PRINT"  IF TH
E WORD CAN BE BROKEN UP  INTO SY
LLABLES, CONSIDER THE TWOPARTS T
O BE TWO WORDS; THE FIRSTWORD, (
PART), IS FOLLOWED BY A  HYPHEN.
"
30 EXEC44539:PRINT:PRINT"  THE B
ALANCE OF THE ROW IS     FILLED
WITH 'BLANK SPACES'.  THESECOND
WORD, (PART), BEGINS AT  THE INV
ISIBLE LINE THAT MARKS   OFF THE
 LEFT-MARGIN.  YOU CAN   FIGURE
OUT THE FORMAT FROM THE  SCREEN
AS YOU CREATE THE TEXT
31 PRINT"LINE."
32 EXEC44539:PRINT:PRINT"  IF YO
U WANT TO DO THE WHOLE    TUTORIA
L OVER, EDIT LINE2000, BYINSERTI
NG A SPACE BETWEEN 'TEXT'AND 'IN
' AND DELETE 3 SPACES AF-TER 'SO
'.  <RUN>. IF NOT, <PRESSA KEY.>
"
33 EXEC44539:CLS:PRINT@202,"  TH
E END!"
34 GOTO34
2000 CLS:PRINT"  WE WANT TO PRIN
T LINES OF TEXT IN A NEAT, LOGIC
```

```
AL MANNER SO THAT A PLEASING DIS
PLAY RESULTS.":PRINT:RETURN
```

Listing 2: TUTOR 2

```
0 '<LISTING2>
3000 REM THIS IS THE WAY A RAW R
EM LINE MIGHT LOOK, IF IT WERE K
EYED IN.------<LIST ONE LINE AT
A TIME TO FOLLOW THIS TUTORIAL>.
3010 'IT WOULD BE A GOOD IDEA TO
HIGHLIGHT IT WITH A STRING OF 3
STARS.
3020 '***THIS MAKES IT STAND OUT
SO IT CAN BE EASILY LOCATED.
3030 '***DID YOU NOTICE IN LINE
3020 THAT THE SPACE AFTER 'OUT'
WAS DELETED SO THAT 'SO' WOULD
RUN AT THE LEFT MARGIN?
3040 '***DID YOU NOTE THAT IN
LINE3030, THE 'R' IN 'RUN' WAS
PUSHED DOWN, VIA A SPACE SO IT
BEGAN AT THE LEFT MARGIN?
3050 '***IN LINE3040, YOU NO-
TICED THREE 'PUSHES' TO MAKE THE
WORDS BEGIN AT THE LEFT MARGIN!
3060 '***DID YOU SEE HOW 'NO-
TICED' WAS SYLLABLIZED?  IF IT
WERE NOT, THE 'D' OF 'NOTICED'
IN LINES 3040 AND 3050 WOULD BE
HANGING ON THE NEXT LINE AND
MAYBE ADVERSELY AFFECT OTHER
WORDS IN A LONG REM LINE.
3070 '***REMEMBER, YOU SHOULD BE
COMPOSING AND FORMATING REMS AT
THE SAME TIME.  YOU GET WHATEVER
REM LINE THAT YOU SEE ON THE
SCREEN AS YOU CREATE IT.  ADJUST
THE LINES AS YOU KEY THEM IN.
3080 '***WHEN YOU HAVE A GROUP
OF REM LINES, YOU MAY FIND IT OF
VALUE TO SEPARATE THEM WITH A
LINE LIKE THE FOLLOWING:
      <3075 '***> OR <3075 '>
  NOW MAKE A REAL LINE3075 AND
SEE HOW NICELY IT SEPARATES REM
STATEMENTS 3070-3080. <LIST>
```

Listing 3: GOSUBTUT

```
0 '<LISTING3>
5 CLS:PRINT@194,"TO ADVANCE, PRE
SS ANY KEY":PRINT:PRINT" WELL, W
HAT ARE YOU WAITING FOR? ":EXEC4
4539
10 CLS:GOSUB100:GOSUB110:GOSUB12
0:GOSUB123:GOSUB124:GOSUB125:GOS
UB126:GOSUB127:GOSUB128
20 CLS:GOSUB120:PRINT@255,"":GOS
UB123:PRINT@255,"":GOSUB124:PRIN
T@255,"":GOSUB125:PRINT@255,"":G
OSUB126:PRINT@255,"":GOSUB127:PR
INT@255,"":GOSUB128
30 CLS:GOSUB120:GOSUB200:GOSUB12
3:GOSUB200:GOSUB124:GOSUB200:GOS
UB125:GOSUB200:GOSUB126:GOSUB200
:GOSUB127:GOSUB200:GOSUB128
40 CLS:GOSUB120:GOSUB300:GOSUB30
1:GOSUB303:GOSUB310:GOSUB315:GOS
UB320:GOSUB325:GOSUB330
50 GOTO10
99 GOTO99
100 PRINT:PRINT"  LET US EXPLORE
 A FEW METHODS  THAT ALLOW US TO
 PLACE PANELS OFTEXT ONTO THE SC
REEN IN A MAN-  NER DESIGNED TO
AVOID REPETI-   TION, BORDDOM AN
D PREDICTABIL-  ITY."
101 PRINT:PRINT"  THE FIRST METH
OD THAT COMES TOMIND, IS MERELY,
 TO CLEAR THE   SCREEN AND SPLAT
 ON THE NEXT    PANEL.  THIS SYS
TEM REQUIRES    CARE IN PREPARIN
G BLOCKS OF TEXTTHAT FIT EACH PA
NEL.":EXEC44539:RETURN
110 CLS:PRINT:PRINT"  THE CHANCE
S ARE THAT YOU WILL HAVE TO EXPE
```

THE SOFTWARE HOUSE

SENTINEL DISKETTES
w/Tyvek Sleeves & Labels
10/$10.95 SS/DD 100/$100.00
10/$11.95 DS/DD 100/$110.00

SENTINEL COLORS **Mix or Match**
RED, YELLOW, LT. BLUE, MED. BLUE, GREEN, ORANGE, MAROON, GRAY, BROWN, LAVENDER, WHITE, FUSCHIA
SS/DD 10/$11.95 100/$110.00
DS/DD 10/$12.95 100/$120.00

PROGRAMMERS DISKS
w/Tyvek Sleeves & Labels - 5 Year Warranty
100% Certified - Meet All ANSI Standards
SS/DD 10/$9.00 100/$80.00
1000 BULK/$695.00 + Shipping
DS/DD 10/$9.95 100/$90.00
MINIMUM ORDER 10 DISKS

PRINTER RIBBONS

EPSON MX/RX/FX 70/80	$5.00 Ea.	6/$28.00
RED, GREEN, BROWN, BLUE	$6.00 Ea.	4/$22.00
GEMINI 10/10X/SG10	$2.00 Ea.	DOZ/$22.00
GEM/OKI COLORS	$3.00 Ea.	4/$10.00
OKIDATA 80/82/92/93	$2.00 Ea.	DOZ/$22.00
C.ITOH.NEC 8023, APPLE DMP/IMAGEWRITER	$6.00 Ea.	6/$34.00
RED, GREEN, BROWN, BLUE	$6.50 Ea.	4/$25.00
R.S. DMP 110	$6.50 Ea.	(Commodore 801)
R.S. LP 7, BANANA	$7.50 Ea.	(Commodore 1525)

ALL ITEMS 100% GUARANTEED

Add $2.50 S/H in U.S.A. - Canada Add $3.50 + $1.00/LB
Michigan Residents Add 4% Sales Tax
Send Check/Money Order Payable to:
THE SOFTWARE HOUSE
9020 Hemingway, Redford, MI 48239
(313) 937-3442
VISA MasterCard
Send Card Number & Exp. Date Min. Charge Order $20.00

```
RIMENT AND REWORD   THE TEXT TO
MAKE IT LOOK WELL-  CENTERED, BO
TH HORIZONTALLY AND VERTICALLY.
111 PRINT:PRINT"  THE SAMPLE DIS
PLAY THAT WE AREGOING TO CREATE
IS A LIST OF    NAMES OF COLORS
IN SIX LAN-     GUAGES.  WE SHAL
L PRESENT THEM  IN THREE DIFFERE
NT STYLES TO ADDVARIETY IN OUR P
ROGRAMMING. ":EXEC44539:RETURN
120 CLS:PRINT"  THE FOLLOWING LI
ST CONTAINS   THE NAME OF COLORS
 THAT ARE VERYSIMILAR IN SOUND I
N MANY CASES.  THESE SIMILARLY
SPELLED AND   PRONOUNCED WORDS A
RE COGNATES;  WORDS THAT HAVE A
COMMON ANCES- TOR LANGUAGE. ":PR
INT
122 PRINT:PRINT"            ENGL
ISH",,," GERMAN","FRENCH"," DU
TCH","SPANISH"," SWEDISH","ITAL
IAN":PRINT:EXEC44539:RETURN
123 PRINT:PRINT"             RED"
,,,,"GER. ROT","FR. ROUGE","DU.
 ROOD","SP. ROJO","SW.  ROD","IT
. RUSSO":PRINT:EXEC44539:RETURN
124 PRINT:PRINT"             BLU
E",,,"GER. BLAU","FR. BLEU","DU.
  BLAUW","SP. AZUL","SW.  BLA","
IT. AZZURO":PRINT:EXEC44539:RETU
RN
125 PRINT:PRINT"            BLAC
K",,,"GER.  SCHWARZ","FR.  NOIR"
,"DU.   ZWART","SP.  NEGRO","SW.
   SVART","IT.  NERO":PRINT:EXEC
44539:RETURN
126 PRINT:PRINT"            WHIT
E",,,"GER.  WEISS","FR.  BLANC",
"DU.   WIT","SP.  BLANCO","SW.
 VIT","IT.  BIANCO":PRINT:EXEC44
539:RETURN
127 PRINT:PRINT"            YELL
OW",,,"GER.  GELB","FR.  JAUNE",
"DU.   GEEL","SP.  AMARILLO","SW
.   GUL","IT.  GIALLO":PRINT:EXE
C44539:RETURN
128 PRINT:PRINT"            GREE
N",,,"GER.  GRUEN","FR.  VERT","
DU.   GROEN","SP.  VERDE","SW.
 GRON","IT.  VERDE":PRINT:EXEC44
539:RETURN
200 PRINT@255,"":RETURN
300 A=300:B=356:C=372:D=388:E=40
4:F=420:G=436:X$="             "
301 PRINT@300,"ENGLISH",,,"GR.",
"FR.","DU.","SP.","SW.","IT.":FO
RX=1TO400:NEXT:RETURN
303 PRINT@A,"RED":GOSUB400:PRINT
@B,"ROT";:GOSUB400:PRINT@C,"ROUG
E":GOSUB400:PRINT@D,"ROOD";:GOSU
B400:PRINT@E,"ROJO":GOSUB400:PRI
NT@F,"ROD";:GOSUB400:PRINT@G,"RU
SSO":EXEC44539:GOSUB305:RETURN
305 PRINT@A,X$:PRINT@B,X$;:PRINT
@C,X$:PRINT@D,X$;:PRINT@E,X$:PRI
NT@F,X$;:PRINT@G,X$:FORX=1 TO 10
00:NEXT:RETURN
310 PRINT@A,"BLUE":GOSUB400:PRIN
T@B,"BLAU";:GOSUB400:PRINT@C,"BL
EU":GOSUB400:PRINT@D,"BLAUW";:GO
SUB400:PRINT@E,"AZUL":GOSUB400:P
RINT@F,"BLA";:GOSUB400:PRINT@G,"
AZZURO":EXEC44539:GOSUB305:RETUR
N
315 PRINT@A,"BLACK":GOSUB400:PRI
NT@B,"SCHWARZ";:GOSUB400:PRINT@C
,"NOIR":GOSUB400:PRINT@D,"ZWART"
;:GOSUB400:PRINT@E,"NEGRO":GOSUB
400:PRINT@F,"SVART";:GOSUB400:PR
INT@G,"NERO":GOSUB500
320 PRINT@A,"WHITE":GOSUB400:PRI
NT@B,"WEISS";:GOSUB400:PRINT@C,"
BLANC":GOSUB400:PRINT@D,"WIT";:G
OSUB400:PRINT@E,"BLANCO":GOSUB40
0:PRINT@F,"VIT";:GOSUB400:PRINT@
G,"BIANCO":GOSUB500
325 PRINT@A,"YELLOW":GOSUB400:PR
INT@B,"GELB";:GOSUB400:PRINT@C,"
JAUNE":GOSUB400:PRINT@D,"GEEL";:
GOSUB400:PRINT@E,"AMARILLO":GOSU
B400:PRINT@F,"GUL";:PRINT@G,"GIA
LLO":GOSUB500
330 PRINT@A,"GREEN":GOSUB400:PRI
NT@B,"GRUEN";:GOSUB400:PRINT@C,"
VERT":GOSUB400:PRINT@D,"GROEN";:
GOSUB400:PRINT@E,"VERDE":GOSUB40
0:PRINT@F,"GRON";:GOSUB400:PRINT
@G,"VERDE":EXEC44539
399 GOTO399
400 FORZ=1TO200:NEXT:SOUND100,2:
RETURN
500 EXEC44539:GOSUB305:RETURN
```

ANALOG AND DIGITAL I/O PORT KITS

Parallel 8 bit input & output for your CoCo, and Models 1, III, 4.

- MODULAR DESIGN FOR ADDITION OF MULTIPLE PORTS

I/O PORT KIT INCLUDES. . . .

4.5" x 6" Printed circuit board; All components; Cable (Plugs To CoCo Adapter) Diagnostic software listing (BASIC); and Manual. **(Requires 5V 100 ma supply)**

I/O port kit (J107K)	$35
A-D/D-A Interface (J202K)*	$35
CoCo Adapter-required for CoCo (J110K)	$15
5 Volt Power Supply (D100K)	$25
Relay Array Kit (J027K)	$32

*requires J107K I/O Port kit

COMPLETE SYSTEMS

DIGITAL MEMORY SCOPE—Converts the CoCo TV display into an oscilliscope screen. (S101M) $169.00

DIGITAL RECORDER and DELAY—Record and play back audio signals up to ten seconds. (S102M) $179.00

D & A Research
400 Wilson Avenue
Satellite Beach, FL 32937
305/777-7853

16K
ECB

CoCo Takes the Plunge: Pool Maintenance Made Easy

By Stephen Snider

Swimming Pool Maintenance is a program to give the new pool owner a helping hand in maintaining proper pool conditions. Although new owners will get the most benefit from this program, experienced owners can also find useful information.

The program is menu driven and user friendly. It runs on a 16K Extended BASIC computer. On initialization, the menu gives several choices:

1) Calculate Pool Size in Gallons — This information is needed in the next section. It calculates the size of either rectangular, oval or circular pools.

2) Adjust Chlorine Level — This section asks for the pool size in gallons, air temperature, water temperature and chlorine test results. It then determines the proper amount of chlorine to be added to bring it up to the desired level. It calculates the proper level for either stabilized or non-stabilized pools.

The calculations are taken from manufacturer's specifications. It may be necessary to adjust the results to individual circumstances discovered by daily testing. If the test results are high from day to day, then less chlorine needs to be added. Once a regular pattern has been established, this section will probably not be needed.

3) Adjust PH Level — This section asks for the results of the PH test. It then gives the chemicals needed (if any) to obtain the proper level.

4) Winterize Pool — This section is a data section only. It gives instructions to properly winterize the pool. It also gives additional suggestions on optional equipment to help minimize problems during the winter.

5) Open Pool — This is also a data section. It gives the proper procedure to open the pool at the beginning of swimming season.

6) Pool Problems — This section presents a menu of various pool problems that you might encounter. It lists the probable cause and one or more solutions.

I think pool owners of all kinds will find this program very useful. If you require any assistance, please contact me at P.O. Box 234, Energy, IL 62933. Please enclose an SASE. ☐

Main Menu

```
* * * MENU * * *
1) CALCULATE POOL SIZE(GALLONS)
2) CALCULATE CHLORINE LEVEL
3) CALCULATE PH LEVEL
4) TO WINTERIZE POOL
5) OPEN POOL(BEGIN SEASON)
6) TO TROUBLE SHOOT
INPUT # DESIRED
? 6
```

Trouble-shooting Menu

```
* * * MENU * * *

1) SLIPPERY POOL WALLS & FLOOR
2) GREEN POOL WATER
3) EYES BURN AFTER SWIMMING
4) BROWN POOL WATER
5) CLOUDY POOL WATER
6) UNPLEASANT SMELL FROM WATER
7) BROWNISH STAINS ON POOL
8) FOAMING
9) SCALE ON POOL SURFACES
```

Sample Run

```
NUMBER OF PROBLEM? 3
EYES BURN AFTER SWIMMING

* * * * * CAUSE * * * * *

HIGH PH OR TOO MUCH CHLORINE

* * * * * SOLUTION * * * * *

CHECK PH AND CHLORINE CONTENT
WITH TEST KIT. IF THERE IS TOO
MUCH CHLORINE, STOP CHLORINE
DOSAGE AND CHECK CHLORINE DAILY
UNTIL PROPER LEVEL IS REACHED
```

190	177	1330	104
410	10	1490	196
590	130	1630	37
790	96	1730	242
980	129	1890	25
1070	253	END	205
1170	225		

The Listing: SWIMPOOL

```
10 '****************************
20 '*   POOL MAINTENANCE       *
30 '*           BY             *
40 '*    STEPHEN M. SNIDER     *
50 '*    P. O. BOX 234         *
60 '*    ENERGY,IL. 62933      *
65 '****************************
70 PMODE 1,1
80 PCLS
90 SCREEN 1,0
100 DRAW"BM20,180U50R150D50L150R
150U20L30U5R30D25L80U50
110 PAINT (60,170),3,4
120 PAINT (100,170),3,4
130 DRAW"BM4,190U75R190D75L190
140 PAINT (25,189),2,4
150 DRAW"BM20,40U20R10D10L10BR20
U10D20R10U20L10R10BR10D20R10U20L
10R10BR10D20R10
160 DRAW" BM20,68U20 F5E5D20BR10
U20R10D10L10R10D10BR10R10L5U20L5
R10BR10D20U20F10D10U20BR10R10L5D
20BR15U20R10L10D10R5L5D10R10BR10
U20F10U10D20BR10U20R10D10L10R10D
10BR10U20F10U10D20BR10R10L10U20R
10BR10R10L10D10R5L5D10R10
170 FOR I=1 TO5000:NEXT
180 CLS
190 CLS:PRINT @ 4,"* * * MENU *
* *"
200 PRINT"1) CALCULATE POOL SIZE
(GALLONS)"
210 PRINT"2) CALCULATE CHLORINE
LEVEL"
220 PRINT"3) CALCULATE PH LEVEL"
230 PRINT"4) TO WINTERIZE POOL"
240 PRINT"5) OPEN POOL(BEGIN SEA
SON)"
250 PRINT"6) TO TROUBLE SHOOT"
260 PRINT"INPUT # DESIRED"
270 INPUT Q: ON Q GOTO 280, 550,
 910, 970, 1150, 1260
280 CLS
290 INPUT"POOL IS RECTANGULAR (R
),      CIRCULAR (C) OR OVAL (
O)";P$
300 IF P$="R" GOTO 330
310 IF P$="C" GOTO 400
320 IF P$="O" GOTO 460
330 INPUT"POOL LENGTH IS";L
340 INPUT"POOL WIDTH IS";W
350 INPUT"AVERAGE DEPTH IS";D
360 G=L*W*D*7.5
370 PRINT"YOUR POOL HOLDS ";G;"
GALLONS"
380 FOR I = 1 TO 3000 : NEXT
390 GOTO 190
400 INPUT"POOL DIAMETER IS";W
410 INPUT"AVERAGE DEPTH IS";D
```

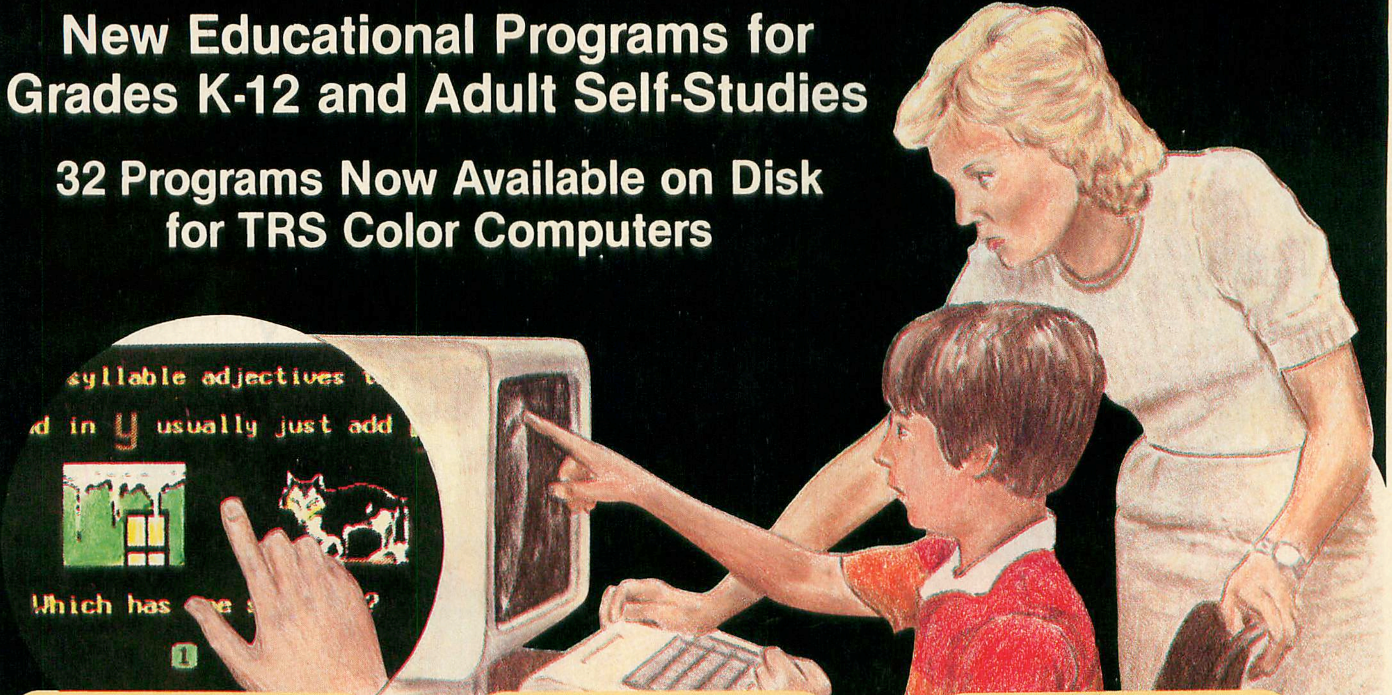
Now! 500 new programs for the Tandy 1000!

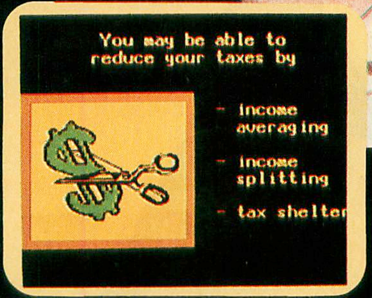
For Your TRS-80 Color Computer

Apple - Atari - Commodore - TRS 80 I, III, 4 & Color - IBM PC Jr. - Tandy 1000

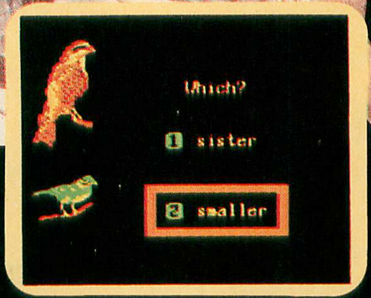
New Educational Programs for Grades K-12 and Adult Self-Studies

32 Programs Now Available on Disk for TRS Color Computers

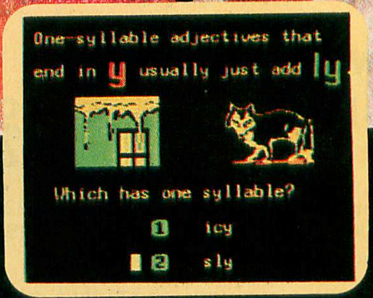




```
You may be able to
reduce your taxes by

- income
  averaging
- income
  splitting
- tax shelter
```



```
Which?

1 sister

2 smaller
```



```
One-syllable adjectives that
end in y usually just add ly.

Which has one syllable?

1 icy
2 sly
```

Interactive Tutorial Programs for Home or Classroom Use

Over 1000 programs for your selection with 32 now available on disk for the Color Computer and 500 now available for the Tandy 1000.

"We're Your Educational Software Source"

Subject	No. of Programs
Reading Development	256 (4 on disk)
Reading Comprehension	48 (4 on disk)
Mathematics	128
Algebra	16 (16 on disk)
History	32 (4 on disk)
Spelling	16
Government	16
Physics	16 (4 on disk)

16 Programs in each of the following:

Children's Tales - Carpentry - Electronics Health Services - Office Skills - Statistics First Aid/Safety - Economics - Business Accounting - Psychology - MUCH MORE!

Send for our free catalog of over 1000 Dorsett educational programs for Atari, TRS 80, Apple, IBM PC Jr., Commodore, Tandy 1000, etc.

Apple II, TRS 80 I, III, & 4, and Commodore 64 computers require respective conversion kits (plug-in board and stereo cassette player), **$99.00.** Atari 400/600/800/1200 computers require the Atari cassette recorder and the Dorsett 4001 Educational Master Cartridge, **$9.95.** For the IBM PC Jr. a cassette adapter cable and a good cassette recorder are required. The Tandy 1000 requires the Dorsett M1001 speaker/PC board kit, **$69.00,** and a standard cassette recorder. A Radio Shack CCR-81 or CCR-82 is recommended.

CASSETTES: $59.90 for an album containing a 16-program course (8 cassettes with 2 programs each); **$8.80** for a 2-program cassette.

DISKS: $14.95 for a one-program disk; **$28.95** for two disks; **$48.95** for four disks. All disks come in a vinyl album.

Dealer Inquiries Welcome

Dorsett Educational Software features:

- Interactive Learning
- User Friendly
- Multiple Choice and Typed
- Program Advance with Correct Response
- Full-time audio narration (Cassette Programs Only)
- Self-Paced Study
- High Resolution Graphics
- Easy Reading Text

For more information, or to order call.

TOLL FREE 1-800-654-3871
IN OKLAHOMA CALL (405) 288-2301

MasterCard VISA

DORSETT
Educational Systems, Inc.
Box 1226, Norman, OK 73070

Help Us Battle the High Cost of Disk Drives

PREBLES
1983
PROGRAMS

NOW . . .
V-PRINT
A utility to print directory on paper
$9.95

New Lower Price
Un-DISK Drives ~~$49.95~~? $34.95

You Bet! There are empty spaces in your 32K and 64K CoCo. The Preble VDOS Un-DISK helps you fill them up with PROGRAMS!

- Un-DISK uses your computer's extra memory like a fast disk drive.
- Un-DISK can store BASIC and MACHINE LANGUAGE programs.
- Un-DISK is INVISIBLE. Yup! Un-DISK does not interfere with normal Color Computer Operation.
- Un-DISK appears only when you type the magic word VDOS.
- Un-DISK comes with comprehensive instructions which you may not need because:
- Un-DISK is self-prompting and easy to use!
- Un-DISK is provided on cassette.
- Un-DISK is faster than a slow clumsy DISK DRIVE and best of all . . .
- Un-DISK is CHEAPER than a DISK DRIVE!
- Un-DISK will work even if you already own a disk but WHY BUY A DISK AT ALL?
- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

OK sure, disk drives ARE NICE. I own one. But if your finances are limited, the Un-DISK can give you much of the power of the mechanical drive. Even if you already own a disk the Un-DISK can work like a super fast extra disk.

EXTRA . . . EXTRA . . . EXTRA . . . EXTRA . . .
Additional Power For $14.95

Only with VDUMP for the Un-DISK!

- VDUMP lets you make a cassette backup copy of everything stored in the Un-DISK.
- VDUMP lets you save 5, 10, 15 or more programs on a single cassette tape file.
- VDUMP lets you switch Un-DISKs. With a single load operation replace a group of financial programs with a set of children's programs. (The new VDUMP tape overwrites the old.)
- VDUMP can allow you to save a whole lot of RAINBOW ON TAPE in a SINGLE file.
- VDUMP is the perfect companion to the Preble VDOS Un-DISK.

Available from Doctor Preble's Programs, naturally! Bringing you fine Color Computer Products Since 1983!

The Preble VDOS Un-DISK	**$34.95**
The Preble VDUMP	$14.95
Shipping & handling U.S. and Canada	$1.50
or $5.00 to other foreign points	

VISA and MasterCard accepted

DR. PREBLE'S
SINCE 1983
PROGRAMS

Order From:
Dr. Preble's Programs
6540 Outer Loop
Louisville, KY 40228
(502) 966-8281
Canadians may order from Kelly Software

```
420 G=W*W*D*5.9
430 PRINT"YOUR POOL HOLDS";G;"GA
LLONS
440 FOR I=1 TO 3000:NEXT
450 GOTO 190
460 INPUT"POOL LENGTH IS";L
470 INPUT"POOL WIDTH IS";W
480 INPUT"AVERAGE DEPTH IS";D
490 G=L*W*D*5.9
500 PRINT"YOUR POOL HOLDS";G;"GA
LLONS"
510 FOR I= 1TO3000:NEXT
520 GOTO 190
530 REM THE CALCULATIONS IN THIS
 SECTION ARE FROM CHLORINE MANUF
ACTURERS SPECS.
540 REM THEY MAY NEED TO BE ADJU
STED TO INDIVIDUAL CIRCUMSTANCES
550 CLS:PRINT"* * * ADJUST CHLOR
INE * * *"
560 INPUT"IS YOUR POOL PROPERLY
STABILIZEDAND ARE YOU USING STAB
ILIZED     CHLORINE";S$
570 IF S$="NO" OR S$="N" GOTO 74
0
580 INPUT"AMOUNT OF WATER IN POO
L (GALLONS)";GA
590 CL=GA/10000*2.5
600 INPUT"AIR TEMPERATURE";A
610 INPUT"WATER TEMPERATURE";WA
620 INPUT"CHLORINE TEST RESULTS"
;RE
630 IF RE <1 THEN GOTO 690
640 IF RE>=1 AND RE<1.5 THEN CLS
:PRINT"CHLORINE LEVEL CORRECT"
650 IF RE>1.5 THEN CLS:PRINT"CHL
ORINE LEVEL TOO HIGH"
660 PRINT"DISCONTINUE CHLORINE M
AINTENANCEAND CHECK LEVEL DAILY
UNTIL     CHLORINE REACHES PROPE
R LEVEL"
670 FOR I=1 TO 3000:NEXT
680 GOTO 190
690 IF A>=100 OR WA>=85 THEN CL=
CL+1
700 CLS
710 PRINT"YOU NEED TO ADD";CL;"O
ZS. OF STABILIZED CHLORINE TO YO
UR POOL."
720 FOR I = 1 TO 3000:NEXT
730 GOTO 190
740 CLS:INPUT"AMOUNT OF WATER IN
 POOL";W
750 INPUT"AIR TEMPERATURE";AI
760 INPUT"WATER TEMPERATURE";WT
770 INPUT"CHLORINE TEST RESULTS"
;CH
780 IF CH<1 THEN GOTO 850:NEXT
790 IF CH>=1 AND CH<1.5 THEN CLS
:PRINT"CHLORINE LEVEL CORRECT"
800 FOR I = 1 TO 3000:NEXT
810 GOTO 190
820 IF CH>1.5 THEN CLS:PRINT"CHL
ORINE LEVEL TOO HIGH"
830 FOR I = 1 TO 3000:NEXT
840 GOTO 190
850 CL=W/5000*3.5
860 IF AI>100 THEN CL=CL+1
870 IF WT>85 THEN CL=CL+1
880 CLS:PRINT"YOU NEED TO ADD";C
L;"OZS. OF       CHLORINE TO YOU
R POOL"
890 FOR I = 1 TO 5000:NEXT
900 GOTO 190
910 CLS:INPUT"PH TEST RESULTS:";
PH
920 IF PH<7.2 THEN CLS:PRINT"ADD
 ONE POUND OF SODA ASH AND   CHE
CK AGAIN 4 HOURS LATER."
930 IF PH>=7.2 AND PH<7.8 THEN C
LS:PRINT"PH LEVEL CORRECT"
940 IF PH >7.8 THEN CLS:PRINT"AD
D ONE POUND OF ACID AND CHECK AG
AIN 4 HOURS LATER"
950 FOR I = 1 TO 4000:NEXT
960 GOTO 190
970 CLS:PRINT@33,"* * * WINTERIZ
E POOL * * *"
980 PRINT:PRINT"1) EXAMINE ENTIR
E METAL         FRAMEWORK CAREFU
LLY. ANY SIGNS  OF RUST SHOULD B
E SANDED AND    RE-PAINTED. COAT
 ALL METAL      SURFACES WITH WA
X."
990 PRINT:PRINT"2) CHECK FOR LEA
KS. A POOL      EXPOSED TO FREEZ
ING TEMPERATURESMUST NOT LEAK."
1000 PRINT:INPUT"TO CONTINUE HIT
 <ENTER>";E$
1010 CLS:PRINT@33,"* * * WINTERI
ZE POOL * * *"
1020 PRINT:PRINT"3) REMOVE ALL A
CCESSORIES, PIPESETC. THE SKIMME
R AND OTHER THRU THE WALL FIXTUR
ES MAY REMAIN IF KEPT EMPTY."
1030 PRINT:PRINT"4) DROP LEVEL O
F WATER WELL     BELOW SKIMMER O
PENING OR ANY    OTHER THRU THE
WALL FIXTURES."
1040 PRINT:INPUT"TO CONTINUE HIT
 <ENTER>";E$
1050 CLS:PRINT@33, "* * * WINTER
IZE POOL * * *"
1060 PRINT:PRINT"5) TREAT POOL W
ITH ALGAECIDE ANDSUPERCHLORINATE
. ADD CHEMICALS  ACCORDING TO MA
```

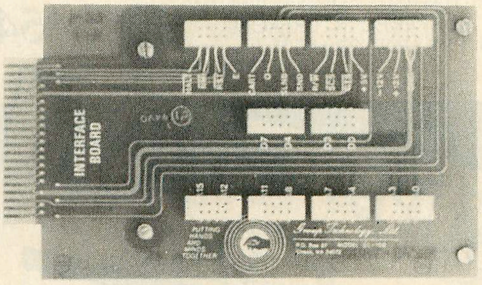
```
NUFACTURERS      SPECIFICATIONS.
"
1070 PRINT:PRINT"6) DO NOT DISTU
RB POOL AFTER    FREEZING. DISTU
RBING WATER IN   POOL AFTER FREE
ZING COULD RESULTIN MAJOR DAMAGE
 TO SEAMS AND    JOINTS."
1080 PRINT:INPUT"TO CONTINUE HIT
 <ENTER>";E$
1090 CLS:PRINT@33,"* * * WINTERI
ZE POOL * * *"
1100 PRINT:PRINT"OPTIONAL ACCESS
ORIES:"
1110 PRINT:PRINT"1) POOL COVER T
O KEEP OUT LEAVESAND OTHER DEBRI
S. DO NOT DISTURBIT AFTER IT BEC
OMES FROZEN IN   ICE."
1120 PRINT:PRINT"2) AIR PILLOWS.
..INSTALLED UNDERCOVER TO RAISE
FOR DRAINAGE."
1130 PRINT:INPUT"TO CONTINUE HIT
 <ENTER>";E$
1140 GOTO 190
1150 CLS:PRINT@33,"* * * OPEN PO
OL * * *"
1160 PRINT:PRINT"1) FILL POOL WI
TH WATER UP TO   MIDDLE OF SKIMM
ER OPENING."
1170 PRINT:PRINT"2) CHECK PUMP,
FILTER AND       CIRCULATORY SYS
TEM FOR PROPER   OPERATION."
1180 PRINT:PRINT"3) ADJUST PH LE
VEL."
1190 PRINT:INPUT"HIT <ENTER> TO
CONTINUE.";E$
1200 CLS:PRINT@33,"* * * OPEN PO
OL * * *"
1210 PRINT:PRINT"4) ADJUST TOTAL
 ALKALINITY.     CONSULT PROFESS
IONAL."
1220 PRINT:PRINT"5) SUPERCHLORIN
ATE WITH 5-10    TIMES NORMAL RE
QUIRED CHLORINE."
1230 PRINT:PRINT"6) STABALIZE. A
LTHOUGH NOT      REQUIRED, IT IS
 BEST TO         STABILIZE YOUR
POOL TO ALLOW    YOUR CHLORINE T
O WORK BETTER."
1240 PRINT:INPUT"HIT <ENTER> TO
CONTINUE";E$
1250 GOTO 190
1260 CLS:PRINT@33,"* * * MENU *
* *"
1270 PRINT:PRINT"1) SLIPPERY POO
L WALLS & FLOOR"
1280 PRINT"2) GREEN POOL WATER"
1290 PRINT"3) EYES BURN AFTER SW
IMMING"
1300 PRINT"4) BROWN POOL WATER"
1310 PRINT"5) CLOUDY POOL WATER"
1320 PRINT"6) UNPLEASANT SMELL F
ROM WATER"
1330 PRINT"7) BROWNISH STAINS ON
 POOL"
1340 PRINT"8) FOAMING"
1350 PRINT"9) SCALE ON POOL SURF
ACES"
1360 PRINT:INPUT"NUMBER OF PROBL
EM";N
1370 ON N GOTO 1380, 1450, 1520,
 1590, 1660, 1730, 1800,1870, 19
40
1380 CLS:PRINT"SLIPPERY POOL WAL
LS AND FLOOR"
1390 PRINT:PRINT"* * * * * CAUSE
 * * * * *"
1400 PRINT:PRINT"ALGAE PRESENT I
N POOL WATER"
1410 PRINT:PRINT"* * * * * SOLUT
ION * * * * *"
1420 PRINT:PRINT"USE ALGAECIDE A
CCORDING TO      MANUFACTURERS D
IRECTIONS"
1430 FOR I=1 TO 10000: NEXT
1440 GOTO 190
1450 CLS:PRINT"GREEN POOL WATER"
1460 PRINT:PRINT"* * * * * CAUSE
 * * * * *"
1470 PRINT:PRINT"USUALLY A RESUL
T OF ABNORMAL    ALGAE GROWTH"
1480 PRINT:PRINT"* * * * * SOLUT
ION * * * * *"
1490 PRINT:PRINT"ADD 4 TIMES REG
ULAR AMOUNT OF   ALGAECIDE AND S
UPERCHLORINATE.  TURN ON FILTER.
 IF NOT          SUCCESSFUL,REPE
AT DOSAGE.       BACKWASH FILTER
 IMMEDIATELY."
1500 FOR I = 1 TO 10000: NEXT
1510 GOTO 190
1520 CLS:PRINT"EYES BURN AFTER S
WIMMING"
1530 PRINT:PRINT"* * * * * CAUSE
 * * * * *"
1540 PRINT:PRINT"HIGH PH OR TOO
MUCH CHLORINE"
1550 PRINT:PRINT"* * * * * SOLUT
ION * * * * *"
1560 PRINT:PRINT"CHECK PH AND CH
LORINE CONTENT   WITH TEST KIT.
IF THERE IS TOO  MUCH CHLORINE,
STOP CHLORINE    DOSAGE AND CHEC
K CHLORINE DAILY UNTIL PROPER LE
VEL IS REACHED"
1570 FOR I = 1 TO 10000: NEXT
1580 GOTO 190
1590 CLS:PRINT"BROWN POOL WATER"
1600 PRINT:PRINT"* * * * * CAUSE
```

```
 * * * * *"
1610 PRINT:PRINT"TO MUCH MINERAL
 CONTENT IN WATEROR DEAD ALGAE"
1620 PRINT:PRINT"* * * * * SOLUT
ION * * * * *"
1630 PRINT:PRINT"HAVE WATER PROF
ESSIONALLY       ANALYZED. IF PR
OBLEM STEMS FROM DEAD ALGAE, CON
TINUOUS OPERATIONOF FILTER IS NE
CESSARY. BACKWASHFILTER IMMEDIAT
ELY"
1640 FOR I = 1 TO 12000: NEXT
1650 GOTO 190
1660 CLS:PRINT"CLOUDY POOL WATER
"
1670 PRINT:PRINT"* * * * * CAUSE
 * * * * *"
1680 PRINT:PRINT"IMPROPER PH BAL
ANCE, HARD WATER,INSUFFICIENT CH
LORINE CONTENT ORFOREIGN MATTER
IN WATER"
1690 PRINT:PRINT"* * * * * SOLUT
ION * * * * *"
1700 PRINT:PRINT"CHECK PH WITH T
EST KIT AND      ADJUST AS NEEDE
D. CONSULT       PROFESSIONAL ON
 HARD WATER. TESTCHLORINE CONTEN
T WITH TEST KIT  AND ADJUST AS N
EEDED. IF FOREIGNMATTER IS PRESE
NT, CHECK FILTER AND CLEAN IF NE
CESSARY.
1710 FOR I = 1 TO 15000: NEXT
1720 GOTO 190
1730 CLS:PRINT"UNPLEASANT SMELL
FROM WATER"
1740 PRINT:PRINT"* * * * * CAUSE
 * * * * *"
1750 PRINT:PRINT"PROBABLY A LACK
 OF CHLORINE     CONTENT"
1760 PRINT:PRINT"* * * * * SOLUT
ION * * * * *"
1770 PRINT:PRINT"TEST FOR PROPER
 CHLORINE CONTENTAND ADJUST AS N
EEDED. IF        CHLORINE TESTS
OK, SUPERCHLORIN-ATE."
1780 FOR I = 1 TO 10000: NEXT
1790 GOTO 190
1800 CLS:PRINT"BROWNISH STAINS O
N POOL"
1810 PRINT:PRINT"* * * * * CAUSE
 * * * * *"
1820 PRINT:PRINT"CORROSION OF ME
TAL PARTS DUE TO LOW PH. HIGH AL
KALINITY. DISSOLVED METALS"
1830 PRINT:PRINT"* * * * * SOLUT
ION * * * * *"
1840 PRINT:PRINT"CHECK AND ADJUS
T PH. CHECK AND ADJUST ALKALINIT
Y. CHECK WITH DEALER ABOUT DISSO
LVED METALS."
1850 FOR I = 1 TO 10000: NEXT
1860 GOTO 190
1870 CLS:PRINT"FOAMING"
1880 PRINT:PRINT"* * * * * CAUSE
 * * * * *"
1890 PRINT:PRINT"TOO HIGH A CONC
ENTRATION OF ALGAECIDE"
1900 PRINT:PRINT"* * * * * SOLUT
ION * * * * *"
1910 PRINT:PRINT"READ PRODUCT LA
BELS CAREFULLY. TOO MUCH ALGAECI
DE DOES NOT HARM POOL OR SWIMMER
S"
1920 FOR I = 1 TO 10000: NEXT
1930 GOTO 190
1940 CLS:PRINT"SCALE ON POOL SUR
FACES"
1950 PRINT:PRINT"* * * * * CAUSE
 * * * * *"
1960 PRINT:PRINT"EXCESSIVELY HAR
D WATER"
1970 PRINT:PRINT"* * * * * SOLUT
ION * * * * *"
1980 PRINT:PRINT"ADJUST ALKALINI
TY"
1990 FOR I = 1 TO 5000: NEXT
2000 GOTO 190
```

PLUG THIS INTO YOUR COCO

Engage mind and **Connect** the world

(or at least the electrical signals used to control outside devices and instruments)



***Expansion Connector Breadboard**, CC-100, accesses the data, address, and control buses, $34.95

***TRS-80 Color Computer Interfacing, With Experiments**, No. 21893, explains and illustrates principles, $14.95

***Experiment Component Package**, CC-150, contains the parts needed to do the experiments, $67.50

Add $1.50 per item for shipping or **get all three for $105.00** plus $3.00 shipping.

Virginia residents add 4% sales tax.

VISA/Master Card accepted. Call 703-651-3153. Free catalog available.

PUTTING HANDS AND MINDS TOGETHER™

Group Technology, Ltd.

P.O. BOX 87 • CHECK, VIRGINIA 24072

THE NEW GENERATION

THE NEW
NX-10
(Replaces the SG-10)

COMPLETE NX-10
PRINTER SYSTEM

• 5K BUFFER • IMPROVED NLQ • QUAD HIGH & WIDE PRINTING • EXTENDED CHARACTER SETS • 10 INTERNATIONAL FONTS • IN-THE-CASE ADJUSTABLE TRACTOR • REVERSE LINE & FORM FEEDS • 120 CPS (DRAFT) 30 CPS (LQ) • FONT CONTROL & MARGIN CONTROL FROM CONTROL PANEL • 1 YEAR WARRANTY SERVICEABLE NATIONWIDE • AUTOMATIC LINE CENTERING • LEFT OR RIGHT HAND JUSTIFYING • SINGLE SHEET PAPER FEED • 7 GRAPHICS MODES

COMPLETE SYSTEM

NX-10 • BLUE STREAK II • SUPER GEMPRINT
TYPE SELECTION/TUTORIAL • WORD PROCESSOR 2.2

$309^95 + $10 Shipping and Insurance

FREE WITH SYSTEM PURCHASE

Drayon's
WORD PROCESSOR 2.2
TAPE OR DISK VERSION

A feature packed program that turns your CoCo into an office machine. Create and save letters and documents with the Word processor tailored for the NX-10.

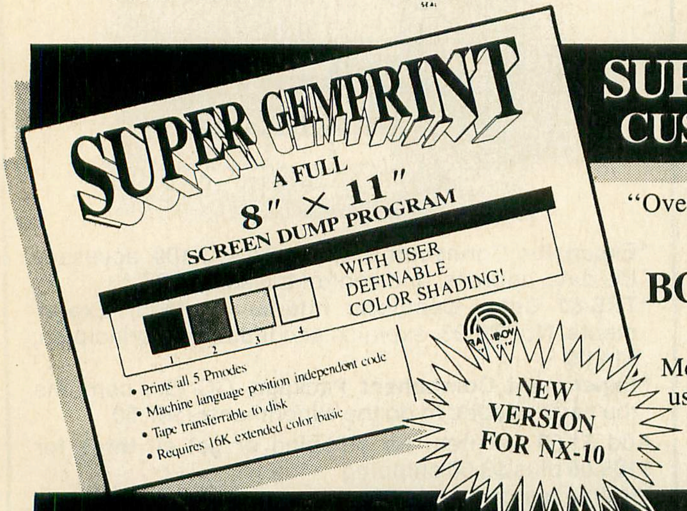
BLUE STREAK II
SERIAL TO PARALLEL INTERFACE

9600
4800
2400
1200
600
300
BLUE STREAK II
DAYTON ASSOCIATES
(513) 236-1454

- RUN COCO I or II to PARALLEL PRINTER
- HIGH QUALITY TOGGLE SWITCH ELIMINATES CABLE SWITCHING
- 300, 600, 1200, 2400, 4800, 9600 SWITCHABLE BAUD RATES
- AC POWER OPTIONAL-NOT NEEDED WITH NX-10 PRINTER
- COMPLETE WITH **ALL** CABLES AND CONNECTORS
- THRU-PUT EQUIVALENT TO BUFFERED INTERFACES
- 1 YEAR WARRANTY

RAINBOW CERTIFICATION SEAL

$54^95 SHIPPING PAID!


SUPER GEMPRINT
A FULL
8" × 11"
SCREEN DUMP PROGRAM
WITH USER DEFINABLE COLOR SHADING!
1
2
3
4
• Prints all 5 Pmodes
• Machine language position independent code
• Tape transferrable to disk
• Requires 16K extended color basic
RAINBOW
NEW VERSION FOR NX-10

SUPER GEMPRINT
CUSTOM SOFTWARE

"Overall, **Super Gemprint** is very well-written and documented."
—Rainbow December 84 review.

BONUS! **TYPE SELECTION/TUTORIAL PROGRAM**
FREE WITH SUPER GEMPRINT

Menu driven program for the CoCo. Teaches and shows the new user the numerous features of the **NX-10.**

SUPER GEMPRINT AND
TYPE SELECTION/TUTORIAL PROGRAM **$17^95** + $2 Shipping and Handling

DAYTON ASSOCIATES of W.R. HALL, INC.

star micronics • inc
AUTHORIZED
DEALER

DUN & BRADSTREET LISTED
7201 CLAIRCREST BLDG. C
DAYTON, OHIO 45424
OHIO RESIDENTS ADD 6% SALES TAX
C.O.D. ADD $2.00

AUTO•ORDER LINE
1-800-251 STAR
Personal Service
(513) 236-1454

RAINBOW REVIEWS

Advanced Utilities
Five OS-9 Goodies/*Computerware* 174

Algebra
Simplifies and Solves Equations/*M F Estes Softhead Co.* 179

Biosphere
Educational Simulation Offers Challenge/*Tandy Corp.* 167

CD Editor
Provides Invisible Convenience/*C & D Computer Products* 159

CGP-220 Screen Dump Package
Has Options Galore/*CMD Micro Computer Services Ltd.* 173

French Package
Sharpens Language Skills/*David M. Compton* 168

Hall of the King
Challenges Avid Adventurers/*Prickly-Pear Software* 173

Health Programs
The CoCo Health Consultant/*Health Software* 164

Line Editor
Works Well with Compilers/*CMD Micro Computer Services Ltd.* 165

Math Mission
Reinforces Skills Shooting Gallery-Style/*Sugar Software* 158

Money Math
Teaches Coin Values/*CY-BURNET-ICS* 172

NumberJack
An Auxiliary Keyboard Input Device/*HJL Products* 176

SCRDMP10
Useful, Quick and Easy/*Neat-O Software* 178

SemiGraphics Support Utility
Unleashes Hidden Abilities/*Micro Computer Systems* 163

Super Duper Utilities
Packs a Punch/*Spectrum Projects, Inc.* 181

Super RAMDisk
Provides Mega-memory/*Spectrum Projects, Inc.* 160

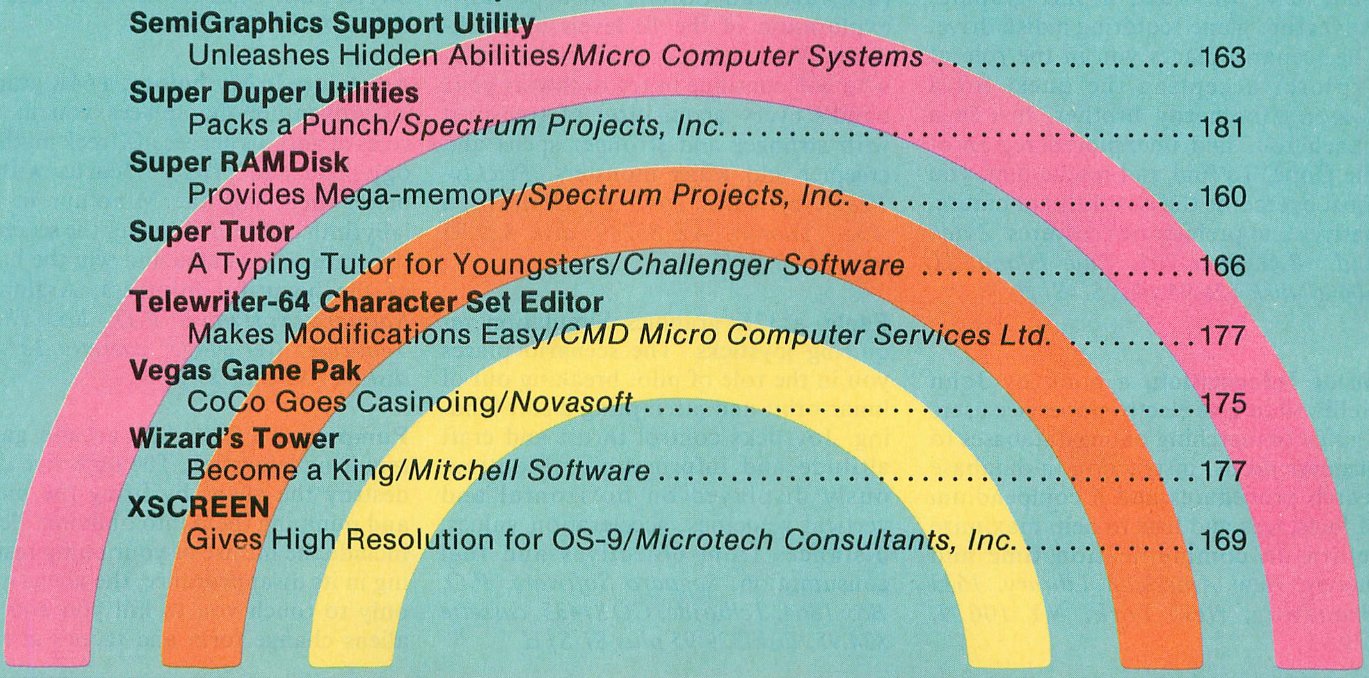
Super Tutor
A Typing Tutor for Youngsters/*Challenger Software* 166

Telewriter-64 Character Set Editor
Makes Modifications Easy/*CMD Micro Computer Services Ltd.* 177

Vegas Game Pak
CoCo Goes Casinoing/*Novasoft* 175

Wizard's Tower
Become a King/*Mitchell Software* 177

XSCREEN
Gives High Resolution for OS-9/*Microtech Consultants, Inc.* 169



RECEIVED & CERTIFIED

The following products have recently been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the *Seal of Certification* has been issued to:

Car Dealer Assistant, a financial utility program designed to provide car dealers with an efficient way to figure four "what if" computations for use in negotiating, insurance calculations, rolling of all amortization variables, conversion of annual add-on rate to A.R.P. and two utility programs to change applicable tax rates and/or erase accounts from the disk. *Sylvester Software, 6943 Oleander Avenue, Highland, CA 92346, disks and manual $195*

Digital Memory Oscilloscope, a hardware/software kit requiring a 64K CoCo 2 with Level II RAM to convert a CoCo TV display into an oscilloscope screen for audio range signals and lower. Auto-trigger and storage in 8K buffer allows detailed study of AC and slowly changing DC signals. *D & A Research, 400 Wilson Avenue, Satellite Beach, FL 32937, unit includes all necessary hardware and software, $169*

Plateau of the Past, a 32K graphics Adventure game requiring a disk drive. The scenario places you in the role of explorer accepting the quest for a tycoon's foolhardy brother, lost in a treacherous and unexplored region of the globe. To find and rescue him, you must overcome the hostilities of nature, natives and prehistoric creatures. *Zytek Ltd., P.O. Box 701, Blue Island, IL 60406, disk $26.95 plus $2 S/H*

Inside Information, a book by John Helliwell to give electronic service users a guide to matching online databases to business needs, instruction in database search procedures and a compendium of facts, tips and lists to help maximize return on communication time and money. *New American Library, 1633 Broadway, New York, NY 10019, $19.95*

Casper CoCo Quick Assembler, a 32K programming utility requiring a disk drive that combines the editor, assembler and debugger into one whole. The editor, by looking up symbols and opcodes, saves indexes into tables instead of characters. The debugger is then able to use the assembler to find locations in memory from their position in the editor's source file, which the debugger displays. *Earl W. Casper, 6012 S 14 Pl, Phoenix, AZ 85040, disk $20*

Software Spare Parts, book by Kent Porter consisting of C language routines and utilities covering areas from text processing to matrix algebra, from data conversion to graphics, and including a range of flexible routines that can be plugged into larger programs. *New American Library, 1633 Broadway, New York, NY 10019, $24.95*

Darkmoor Hold, a 64K graphics Adventure requiring a disk drive. The scenario places you and your comrades (a dwarf and an elf) on a perilous exploration of the 10 levels of Darkmoor. Your nemesis is an evil wizard, who will continue to try to thwart your band's every acquisition of treasures with stronger and stronger spells and creepier and wilier monsters. *Prickly-Pear Software, 2640 N. Conestoga Ave., Tucson, AZ 85749, disk $29.95 plus $1.50 S/H*

Eagle, a 32K graphics Simulation requiring joysticks. The scenario places you in the role of pilot breaking out of lunar orbit and attempting a soft landing. Joysticks control thrust and craft altitude and information is continuously displayed on horizontal and vertical velocities, acceleration values, distances from objectives and fuel consumption. *Saguaro Software, P.O. Box 1864, Telluride, CO 81435, cassette $24.95, disk $29.95 plus $1 S/H*

CoCo Valet, a 32K home-based filing system requiring a disk drive. Features include search, edit, mark fields (for selecting fields for printouts), change files, on-screen help and nondestructive cursor. *Derby City Software, 3025 Kozy Kreek Drive, Louisville, KY 40220, disk $21 plus $3 S/H*

A2D Deluxe Joystick, a joystick featuring self-centering as well as free floating operation, mechanical trims on both axes and an eight-foot cable. *Cinsoft, 2235 Losantiville Avenue, Cincinnati, OH 45237, $27.95 each, $49.95 pair*

Best of CoCo-Time '85 (Utilities), a program comprising 18 often-used utilities, most requiring 16K. Among the utilities are: CoCo Disk Zap, 40K BASIC (requires 64K), Banner Creator, DMP Graphics Dump, In Memory Disk Drive (requires 64K), Function Keys, Disk Mailing List (requires 64K), Tape/Disk Encryption and BASIC Program Packer. *Microcom Software, P.O. Box 214, Fairport, NY 14450, cassette or disk $26.95 plus $3 S/H*

U-Buff, a hardware printer buffer designed for user expandability. The U-Buff is available in 16K (P16) and 64K (P64) versions and comes with a handbook detailing installation, operation, upgrades and technical information. *Digital Devices Corporation, 430 Tenth Street, Suite N205, Atlanta, GA 30318, P16 $119.95, P64 $149.95.*

Adventure In Mythology, a 64K graphics Adventure that places you in the roles of various heroes of Greek mythology. You can provide Icarus with a better idea, slay the Minotaur in the labyrinth of Crete, discover the secret of the statue of Galatea and win the hand of the beautiful huntress, Atalanta. *Saguaro Software, P.O. Box 1864, Telluride, CO 81435, cassette $24.95, disk $27.95 plus $1 S/H*

Pumpman, a 32K ML arcade game requiring a joystick. The objective is to destroy the aliens by firing the pump and pumping them into oblivion. Perils include the misuse of your pump resulting in its disappearance, the aliens have only to touch you to kill you and the aliens change form and tactics at random. *Saguaro Software, P.O. Box 1864, Telluride, CO 81435, cassette $24.95, disk $27.95 plus $1 S/H*

CoCo Base I, a 32K relational database manager requiring a disk drive and featuring 10 programs. Possible are up to 600 records of up to 1,000 characters, moving specific data around within the program to allow files to update each other, string and numeric operators to allow any user-definable comparison or calculation and compatibility with all CoCo printers. *JTJ Enterprises, P.O. Box 110841, Nashville, TN 37211, disk $49.95 plus $2 S/H*

Temple of the Lost Ark, a 32K Adventure game for the intermediate Adventurer. Features include a help key for guidance through the hazards and pitfalls and a command interpreter that requires only one-word commands. *The Saint John Gallery, P.O. Box 613, Mount Sinai, NY 11766, cassette $7, disk $8*

Hall of the King II: The Inner Chamber, a 64K graphics Adventure on two disks requiring a disk drive but not *Hall of the King I* for play. This game begins another quest for the legendary Earthstone, the foundation of an ancient dwarven civilization. Only by daring the hazards of the inner chambers can you hope to find and learn to use the Earthstone. *Prickly-Pear Software, 2640 N. Conestoga Avenue, Tucson, AZ 85749, disks $39.95 plus $1.50 S/H*

Uninterrupted Power Source (UPS), a hardware accessory to prevent loss of data from power failures for all computers using 5V memories. It consists of a 2.6AH sealed battery, a control circuit, a miniature toggle switch and a light emitting diode. Three connections are necessary: 5 volts, ground and unregulated 9-12 volts. Supplies power to the memories for as long as two hours when commercial power sources fail. *Dynamic Electronics, Inc. P.O. Box 896, Hartselle, AL 35640, $59.95*

Unkill, a 32K disk utility requiring two disk drives, a printer and knowledge of the printer's compressed mode. It is menu driven and does not require knowledge of files and fat tables in order to recover files from a bad disk to a blank one. *Proper Programs, P.O. Box 681, Garner, NC 27529, disk $9.95 plus $2 S/H*

1986 Tax Estimate, a 32K home financial utility requiring a disk drive. Possible is the estimation of federal tax liability based on the laws in effect at the time of publication. *TRY-O-BYTE, 1008 Alton Circle, Florence, SC 29501, disk $5*

GOTHELLO, a 16/32/64K strategic board game for one or two players with three levels of difficulty. *Bangert Software, P. O. Box 21056, Indianapolis, IN 46221, cassette or disk $12.95*

Graphic Echo, a 16/32K graphics screen dump program designed for Radio Shack dot-matrix printers. Sold on cassette, it is compatible with disk systems and offers regular or enlarged images, positive or negative images, with manually set margins or autocentering, and capable of working in all five PMODEs. *Tothian Software, Box 663, Rimersburg, PA 16248, cassette $14.95*

Vegas Game Pak, a 32K arcade game requiring a joystick and containing the following casino favorites: Regular fruit-type slot machine, Bar-bar five-seven-blank slot machine, Multiline pay fruit-type slot machine, Video poker, Video keno and Video blackjack. *Novasoft, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $24.95, disk $27.95 plus $2 S/H*

CoCo DISKZAP Utility, a disk editor featuring the following commands and functions: Mode, to allow users to specify the disk's sector offset; Zero, allows setting any sector in the disk to Hex 00; Copy; Print; Verify; Format; Display; File Zap, to allow stepping through a file (ML, BASIC or ASCII) to modify any part; and Directory. *SuperCom Associates, 449 Rougemount Drive, Pickering, Ontario, Canada L1W 2B8, manual and disks $39.95 U.S. funds.*

LFAST, Linear-Free-Access-Source-Translation, an assembly utility requiring a disk drive. Possible are the linking of ML programs, insertion of text messages in the object code stream and the ability to point to buffers where text arrays, numeric arrays and ML subroutines are located. *D.J. Leffler, 955 Trinidad Road, Cocoa Beach, FL 32931, $68.50*

KAMELION, an interface operating system (IOS) using the Supercomp 68008 expansion board (produced by Cir-Pac Ltd.). This IOS provides complete co-processing, access and control between a CoCo and the Motorola 68008 microprocessor on the expansion board. CoCo's capabilities are expanded to almost equal the Radio Shack Model 16. Included is the capability to write standard CoCo disk files from the 68008 memory up to full disk capacity for a single file. Also included are complex commands such as CONFIGURE, which can be invoked to configure the 68008 memory with data and machine code files. *D.J. Leffler, 955 Trinidad Road, Cocoa Beach, FL 32931, $78.50*

Code Practice, a 32K instructional aid to help those who would like to learn or improve their skills with International Morse Code. Menu driven, the operator may select listening to random letters, numbers and punctuation or code conversation between Ham Radio operators. Speed at which code is sent can be selected by the operator between two and 90 words a minute. *Sunrise Software, 8901 NW 26 Street, Sunrise, FL 33322, disk $9.95*

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Monica Dorth

REVIEWING REVIEWS

PLANEGEO & PGCALPRT

Editor:

We found the review of *PLANEGEO* and *PGCALPRT* by John McCormick [April 1986, Page 190] to be just and considerate. In reply, we have a few comments to make about the programs and the review.

PLANEGEO is designed to be strong in educational content and is intended for student use or for refresher use by non-students. If used by students, it should be considered supplemental to, and not substitutive for, formal scholastic training. *PGCALPRT* anticipated more use by professionals. Both programs are for serious use.

We regret the reviewer found bugs. We wish we could guarantee there will be no more but there may be some bugs left in spite of the authors' attempts to eliminate them. We will keep users informed of bugs and fixes. The ones reported in the review have, of course, been corrected.

PGCALPRT is written to send every geometric calculation to the printer. The reviewer pointed out that some systems result in no such optional printing. As a result of his valid suggestion, current releases of *PGCALPRT* contain patches that will enable users to either retain the original concept or to change the main and subprograms to provide optional printing. Also, the patches will be supplied in printed form to prior users.

The *CONVERT* subprograms were included in both programs as sort of a bonus. They were not intended to print on the printer.

Thank you for the review and thanks to John McCormick for his work.

George F. Saunderson
TASC

PIXGEN

Editor:

I would like to comment on the review by Eric Tilenius of *PIXGEN* (RAINBOW, February 1986, Page 208).

I feel that Mr. Tilenius did a fair and accurate review of *PIXGEN* utility, but would like to point out some things he may not have been aware of. Mr. Tilenius mentions in his review that he discovered two places in the program where error handling bugs could be found.

The first of these, which occurred when drawing a line, has been fixed.

The second bug occurred during a "paint" operation. The documentation of *PIXGEN* emphasizes several times that the painting utilities must be used carefully. The reason is that the speed achieved by the *PIXGEN*'s painting routines is accomplished by mathematical algorithms that have few internal error handling routines.

The review states that *PIXGEN* could interest anyone wishing to create graphics Adventures where storing pictures on disk is not a valid option. I disagree. *PIXGEN* makes it possible to store several times as many pictures as could be stored on an entire disk in only about 12K of RAM. With the exception of these items, I feel Eric Tilenius did a remarkable job.

Scott A. Cabit
Author of PIXGEN

Track Events

Editor:

We appreciate the review of *Track Events*, Page 200 of the February 1986 RAINBOW. However, it wasn't mentioned that the game requires 64K, and our updated version of the game requires a joystick. We would also appreciate it if you would inform readers of our new address: 3937 Shady Hill, Dallas, TX 75229.

Baron Products
Dallas, TX

Magazine Index System
Disk Pilot

Editor:

Thanks to your reviewers Dan Smith and Larry Goldwasser for their careful reviews of *Magazine Index System* and *Disk Pilot* (December 1985, pages 224 and 233).

Since *Magazine Index System* was submitted for review, a new, updated version has been released (version 1.1). This release corrects minor problems with the original and adds some new features. Files no longer need to be on Drive 0 — any drive on the system can now be accessed by *Magazine Index System*. In addition, the search routines have been rewritten and are now faster than before. The user is no longer limited to nine search terms, nor is the 29 character limit imposed.

Regarding *Disk Pilot*, I'd like to apologize to Mr. Goldwasser. Apparently an addendum sheet was missing from the package he received — this sheet explains the 'S' option, which permits the user to access any of his drives (0 through 3).

Thanks once again for an excellent magazine — keep up the good work, everyone in the CoCo Community appreciates it.

Bob van der Poel
CMD Micro Computer Services Ltd.

CoCo Max II

Editor:

Thank you for the fine review of *CoCo Max II*. We would like to correct, however, a statement that was inaccurate.

Mr. Jackson writes that "*CoCo Max* has no provisions for killing or renaming files." This is not the case. You can leave *CoCo Max* at any time with the "Quit" function, then Kill or Rename any file(s). When finished, simply type `RUN`. The *CoCo Max* screen will come back exactly where you left off, and you don't lose your art work. We think this ability to switch between *CoCo Max* and BASIC at will is much more powerful than a simple Kill and Rename feature would be.

John Monin
Colorware Inc.

We welcome letters to "Reviewing Reviews" and remind you that they may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`.

WAR GAMES

ARK ROYAL GAMES celebrates the New Year with reduced prices on all games...even our two newest releases!

new! SAGA-THE SORCERER'S CURSE 32K 100% hi-res, 100% ML graphic adventure. Fantastic! Disk only —$22

new! REDSTAR 32K 100% hi-res 100% ML. Futuristic wargame involving NATO and the WARSAW PACT. Disk only —$22

BARBAROSSA 64K 100% hi-res 100% ML game of the war in Russia 1941-1944. "A Blockbuster," says Hot Coco's Peter Paplaskas. Reviewed Jan. '86 Hot Coco.—$25

D-DAY Our second 64K 100% hi-res 100% ML, this one dealing with the Allies invasion of France in 1944. Massive! No review date set yet.—$23

PHALANX 32K 100% hi-res, 100% ML game of Alexander the Great. No review date set yet.—$20

ANZIO 32K Semigraphic wargame. 1 or 2 players. Simultaneous movement. No review date set yet.—$20

COMPANY COMMANDER 32K ML routines. Tactical squad level wargame set in WWII. 12 scenarios, add-on expansion modules. Dec. '85 Rainbow.—$23 disk or tape

RIVER CROSSING 32K ML routines. A Company Commander add-on module, but you no longer need C/C to play it.—$23

CINCPAC BATTLE OF MIDWAY 32K 100% hi-res 75% ML. The battle that turned the tide of war. Aug. '85 Rainbow.—$20

ESCAPE FROM DENNA 32K ML routines. Semigraphic Dungeon adventure game. No review date set yet.—$18

BATTLE OF THE BULGE 32K Semigraphic wargame. 1 or 2 players. Aug. '85 Rainbow.—$15

BATTLE FOR TUNIS 32K Semigraphic wargame. 1 or 2 players. Sept. '85 Rainbow.—$15

ACROSS THE RUBICON 32K Semigraphic wargame. Feb. '84 Rainbow.—$15

WATERLOO 32K ML routines. Semigraphic wargame. Mar. '84 Rainbow.—$15

KAMIKAZE 32K Hi-res graphic wargame. Apr. '83 Rainbow.—$15

BOMBER COMMAND 32K disk, 16K tape. Semigraphic wargame. ML routines. Jan. '84 Rainbow.—$10

GUADALCANAL 32K Semigraphic wargame. ML routines.—$10

THE POWER OF THE TRS-80 COMPUTER Book. Loaded with great programming information.—$10 (Shipped book rate)

ARK
ROYAL
GAMES

Prices on all programs include shipping to U.S., APO's, Canada. COD's (USA only) add 10%. Florida Residents add 5%. For disk version add $2. All Orders shipped within 24 hours. Programs require Color Computer TM (Tandy Corp.) or TDP System 100 Computer TM (RCA). Many programs soon to be available on MS-DOS systems.

P. O. Box 14806
Jacksonville, FL 32238
(904) 786-8603

'Shooting Gallery' *Math Mission* Reinforces Skills

Condition red! Prepare for imminent invasion. Protect yourself with intelligence and skill and future generations will honor your courage and knowledge.

Math Mission is an educational game designed to reinforce math skills in addition, subtraction, multiplication and division. It has four levels of difficulty ranging from basic facts to problems with two digits. The program is suitable for first- to fourth-grade students. There is an option that combines all difficulty levels. The game is similar to a shooting gallery and is played with joysticks. Problems are shown with six answers. There is a timer so students must answer the problem promptly, but it is not so fast that it discourages slower students.

It is easy to load and run. If using a disk drive, you are entitled to make two backup copies. With the cassette version, there is an explanation of how to transfer the program to disk.

When running *Math Mission*, you see a title screen and then the main menu. Choose addition, subtraction, multiplication, division and the level of difficulty ranging from basic facts to two digit problems. The game then starts the first of four rounds of play. In each round the student receives 10 problems. The Shot Timer and Power Level Bars with their numerical readouts are in the lower right-hand corner of the screen. When play begins, these are set to the maximum.

The problem is shown at the bottom of the screen with six possible answers at the top. Using the joystick, students move the "gun" under the correct answer and fire. If right, they move on to the next problem and the number of correct responses is shown in the lower left-hand corner. If wrong, the power bar is lowered by 25 percent but they get another chance to answer the problem correctly. If they are correct the second time, the power bar is reset and a right answer is recorded. If wrong again, the correct answer is shown, but a wrong answer is recorded, the power is reduced by 25 percent and they get the next problem.

If four problems are missed in any level, a sad face is displayed and they are told to press the firebutton which returns them to the main menu. A perfect score in any round generates a short song and graphics display. After all four rounds, students receive one of two graphics screens and a musical tune. If they score 100 percent in all four rounds, there is a graphics display showing that they are a "Grand Master of *Math Mission*." For any other score they are shown a screen saying they are a "Master of *Math Mission*."

One distraction though; in the second through fourth rounds, instead of having the graphics on a black screen, they were on a green screen. This made reading some of the numbers hard because I could not see the vertical extension in numbers such as four.

This program would be interesting for elementary students to use. There is plenty of sound, movement and action. I also like how students are given a second chance before getting an answer wrong. When I played, there were times that I knew the right answer, but didn't get the joystick in the right place or pressed the firebutton too fast and it was nice not to be punished for a dexterity mistake.

(Sugar Software, 1719 North 50th Avenue, Hollywood, FL 33021, cassette or disk $24.95 plus $1.50 S/H)

— Thomas E. Nedreberg

Formaker

the fastest, most complete office package yet!

Totally Menu Driven
Customize with company information
Complete "on screen" instructions

FORMS
letter
invoice
quote
purchase order
mail order
confirm order
receipt

STORES
complete forms
item list
subquotes
letters
footnotes
customer info

FIGURES
quantity
list
net
discount
subtotals
tax
freight, etc.

SEPARATE CONFIGURE PROGRAM
for company info
printer options
quote & inv. #
w/auto sequencing
auto date

PRINTS
form feed
letterhead
envelope
multiple copy
emphasized

$49 32k ECB disc

send for more information:

Challenger Software
42 4th Street
Pennsburg, PA 18073
Call (215) 679-8792 (Evenings)

RAINBOW
CERTIFICATION SEAL

Hint . . .

Single Disk *COPY*

Here's a feature which can be invaluable for users with a single disk drive. The Radio Shack Disk Manual mentions that use of the `COPY` Command requires two or more drives. This is not necessarily true. A single drive copy can be made by doing the following:

1) Insert disk with file to be copied into the Drive 0.
2) Type `COPY "FILENAME/ext:0` and press ENTER.
3) There will be one short beep and a notice will appear on the screen instructing the user to insert the destination disk.
4) Insert destination disk and press ENTER.
5) Once completed there will be two copies of the program: one original and one on the destination disk.

This method works for all types of disk files including machine language programs.

CD Editor Provides Invisible Convenience

Using Extended BASIC's line `EDIT` function to make changes in a block of program lines can, at times, be frustrating. I usually end up listing all the lines in the section of interest and then noting those needing changes or corrections. Each line is then edited one by one. Until now, there has been no easy way of working on programs one screen at a time. *CD Editor* from C & D Computer Products provides some relief from the frustration of program editing. This utility program provides many of the features of a full-screen editor without using one extra byte of memory in a 64K CoCo.

CD Editor requires a 64K CoCo with at least one disk drive and should work on all versions of JDOS or Disk BASIC. The program comes on disk in the form of a short BASIC program that copies the BASIC and Extended BASIC ROMs into the upper 32K of RAM. It then checks for the type of Disk BASIC that is being used and loads in new machine code from disk to the upper RAM locations containing the original line editor. The editor fits in the same amount of space that was taken up by the original `EDIT` function. If desired, BASIC's standard OK prompt can be changed to anything you want, up to five characters, such as READY. The loader program then clears the screen and erases itself. The copy that I originally received failed to load properly with JDOS BASIC 1.21. A phone call to C & D Computer Products isolated the problem. A short time later I got a new disk that loaded and ran properly with JDOS BASIC 1.21 and Disk BASIC 1.1.

The program is transparent to BASIC and permits BASIC programs to run as if it did not exist. The cursor becomes a blinking black square that turns into a blinking white square when the editor is active. Typing in the command `EDIT` turns the program on and off.

CD Editor works on any displayed portion of a program that has just been typed in or listed. A movable cursor determines where on the screen any changes are being made. Cursor movement is controlled by the four arrow keys. (The JDOS version uses the shifted up- and down-arrows for vertical motion.)

To delete characters, place the cursor on the first character to be deleted and press the shifted left arrow once for each character that is to be deleted. To add characters, place the cursor at the point of insertion, add blank spaces with the shifted right-arrow key, and then type the new data over the blank spaces. Typing at the current cursor position causes the new text to overwrite the existing text.

None of the changes are actually entered until the cursor is moved to the end of the line being edited and the ENTER key is pressed. Pressing ENTER in the middle of the line causes the last portion of the line to be lost. I had a tendency to forget this and often pressed ENTER immediately after making changes, and not at the end of the line.

The editor also allows two or more program lines to be combined into one. Program lines may also be duplicated by changing the line number of the line that is to be duplicated. I found this last feature quite handy in writing programs that use many lines of nearly identical code. I just duplicated the lines as many times as required and then went back and made the unique changes to each line.

Another program on the disk lets you save the modified BASIC and Extended BASIC into EPROMs to make the screen editor and new prompt a permanent part of the CoCo. I could not try this because I do not own an EPROM programmer. However, I did try the EPROMs loaned to me by C & D Computer Products and had no problems.

The disk comes with a three-page instruction sheet which covers loading and using the program. A copy of the instruction manual is on the disk in the form of a BASIC program. The disk also contains a catalog of other programs from C & D. None of the programs are copy protected so backups can be made. The programs, however, are copyrighted.

(C & D Computer Products, 1706 Seabrook Avenue, Cary, NC 27511, disk $19.95 plus $2 S/H)

— Chuck Wozniak

Visit the
Coco Community Center
THE RAINBOW'S CoCo SIG
on
DELPHI

DYNAMIC COLOR NEWS
A monthly Newsletter with Educational material for writing Programs, New Products, Product Reviews, Programs, and much more.
$15 yr. - Free Sample -
DCN-1, Six PGMS include Character Generator, Loan Interest, & Bank Switching.
DCN-2, Five PGMS include Check Book, Sort, Study, & Address File Programs.
DCN-1 or DCN-2, $9.95 Tape, $11.95 Disk

PROGRAM SAVER
Uninterrupted Power Source (UPS) provides power to RAMS during power failures. For all computers with 5 Volt memories. $59.95

MEMORY EXPANDERS
We have several types of solderless memory expanders from 64K to 512K. Call or write for details.

MEMORY MANAGER
(New Product)
Software designed to manage the second 32K memory bank for 64K computers. Copy ROMS to RAM and stack Programs in the upper memory or use the Friendly RAM Disk to quickly stored or load programs to or from the second memory bank.
$27.95 Cassette, $29.95 Disk.

Checks, Visa & MC Cards. Add $3 ship.
Free Catalog. 24 Hour phone.

DYNAMIC ELECTRONICS
BOX 896 (205) 773-2758
HARTSELLE, AL 35640

Super RAMDisk Provides Mega-memory

"More memory!" they cried. "Give us mega-memory like the competition!" Well, CoCo users, now you have it. Spectrum Projects is distributing a 256/512K memory expansion from DISTO.

To use the DISTO Super RAMDisk you need a 64K CoCo and a Multi-Pak Interface. Why the Multi-Pak? It enables the DISTO upgrade to be used with the CoCo 2, something that has been hindering previous upgrade kits. The unit is housed in an attractive white metal case and plugs into slot number 2 of the Multi-Pak. Software for both Disk BASIC and OS-9 is provided on disks to use the memory upgrade as a RAM disk. With OS-9, up to three RAM disks can be connected at one time.

What is a RAM disk and do I need one? At present, the only software that exists for the Super RAMDisk is drivers that make the memory expansion act as another disk drive. It's not a normal disk drive, though. First, it is super fast. The total time to read or write a sector is less than 5/1,000 of a second. One of the uses could be storage of graphics pages for fast recall during games. Can you write longer programs? Not with the present software. The problem is not with the memory expansion, but with the software. As you are probably aware, Disk BASIC only recognizes 32K of user memory.

To write longer programs, you could split them into small ones, but you can do the same thing with a regular disk drive. You will have to find a way to pass parameters (variables) between programs if necessary. A suggestion is to store them in a file and recall them when necessary. Remember, we are talking about a quiet, fast disk drive that consists of RAM.

The use of a RAM disk with OS-9 is another story. Regarding longer programs, as long as modular programming concepts are used, BASIC09 already has the facility to pass parameters between programs. Considering the disk intensive nature of OS-9, it's a welcome relief to transfer the commands directory to the RAM disk and watch it fly. Commands execute almost instantaneously. No noise either.

There are still memory constraints inherent to OS-9 Level I, but a RAM disk seems to speed up things quite a bit.

Brian Lantz has licensed both the Disk BASIC and OS-9 RAM disk drivers to DISTO. The Disk BASIC version is on a separate disk.

After entering `LOADM"RAMPAK":EXEC`, you are prompted for the default RAM disk drive number and Multi-Pak slot number. Then, you are asked whether to clear the RAM disk.

After these prompts, the RAM disk is formatted and available for use as another disk drive. You are in the 64K RAM mode and the driver is located at $FD00. This is why you are asked whether to clear the RAM disk. If you have to use the Reset button, the data on the RAM disk is not lost, but you have to re-initialize the driver before it can be recovered.

The DISTO Super RAMDisk OS-9 Driver by Brian Lantz is virtually the same driver software used for other memory expansions. The module is named RAMDisk and, after loading this module, you must link the driver "R0" to the system. You must then format the RAM disk. The default format is 40 tracks, single-sided, but the device descriptor can be changed to take full advantage of the spare memory.

The only drawback to doing this is backing up the RAM disk. The use of a utility by Computerware named *Dircopy* makes it easier.

The DISTO unit is compatible with all CoCos. Previous units reviewed would not work with the CoCo 2. The cost of using it is the price of a Multi-Pak. The unit is well-constructed and functions as advertised.

I do see some shortcomings with the Disk BASIC software and documentation. I sometimes wonder how to take advantage of all of this extra memory. The only documentation for Disk BASIC is a typewritten page explaining how to boot the driver. No information is given about the hardware aspects of the unit. The user should have the page addresses and a description of the hardware for experimentation purposes.

The OS-9 software documentation is just adequate. It explains all of the initialization steps and procedure files, but again it lacks any information about the hardware. This is not so bad for OS-9, due to the nature of the system, but I'd like to see it.

In comparison to other units I've seen, this unit is adequate from a hardware standpoint, and doesn't require soldering, wiring or opening the computer. We will have to wait and see if any software other than the RAM disk applications develops.

(Spectrum Projects, Inc., P.O. Box 21272, 93-13 86th Drive, Woodhaven, NY 11421, 256K version $129.95, 512K version $169.96, distributed in Canada by CRC Computers, 10802 Lajeunesse, Montreal, Quebec, Canada H3L 2E8)

— Dan Downard

Two-Liner Contest Winner . . .

Type in *Babbler* and RUN it. See if you can make out what the CoCo Man is trying to say. This would make a cute subroutine.

The listing:

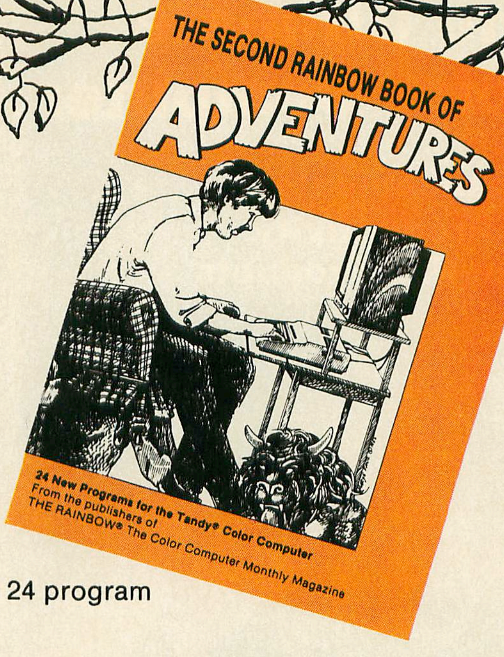
```
0 PCLS:PMODE4,1:SCREEN1,1:CIRCLE
(128,96),50:CIRCLE(112,80),10:CI
RCLE(144,80),10:CIRCLE(112,80),5
:CIRCLE(144,80),5:PAINT(105,80),
5,1:PAINT(137,80),5,1:CIRCLE(128
,96),7:PAINT(129,96),5,1
1 CIRCLE(128,116),10,1:SOUNDRND(
255),RND(10):CIRCLE(128,116),10,
0:DRAW"C1;BM118,116R20":FORA=1TO
RND(200):NEXT:DRAW"C0;BM118,116R
20":GOTO1
```

Brett Bauer
South Bend, Indiana

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

Mind-tingling action!

THE SECOND RAINBOW BOOK OF ADVENTURES


THE SECOND RAINBOW BOOK OF
ADVENTURES
24 New Programs for the Tandy® Color Computer
From the publishers of
THE RAINBOW® The Color Computer Monthly Magazine

Twenty-four of the most challenging Adventure games ever compiled await you in this latest offering from The Rainbow Bookshelf. Journey through time, fight World War III, win the heart of a beautiful and mysterious princess. Experience the titillations of the most rugged Adventurer without ever leaving your seat.

Order The Second Rainbow Book of Adventures and among the 24 program listings you'll receive are:

Yellow Submarine — Meet the Beatles and attempt to outlast the Blue Meanies while enjoying some of the Fab Four's all-time musical hits.
Ring Quest — Regain possession of a magical ring and save a kindom.
Time Tripper — Lost in another dimension.
Chief Inspector — Who killed B.L. Brown?
Sir Randolf Returns — The sequel to a favorite from our first Adventure book.
Silverton House — Where's the money been stashed?
Ice Princess — Just one glance at this beauty will steal your heart.

Experience other traditional and contemporary challenges from these winning authors: Mark Fetherston, Jeff Crow, Larry Lansberry, J.C. Jackson, Robert W. Mangum II, Robert Poppe, David Taylor, Gregory Clark, Steve Skrzyniarz, David L. Dawson, Curtis Boyle, Bruce K. Bell, Pat Pugliano, Pat and John Everest, Mike Fahy, Scott Settembre, Darin Anderson, Robert L. Thomas, Terrance Hale, Paul Hensel, Philip Courie, Michael Dennison and Robert Dickau.

The Second Rainbow Book of Adventures sells for only $13.95!

For greater convenience, order the Second RAINBOW Book of Adventures and Adventures Tape through the shopping area of the CoCo SIG of Delphi!

THREE BONUS PROGRAMS WHEN YOU BUY THE SECOND RAINBOW ADVENTURES TAPE!

That's right. You'll receive a total of 27 fantastic Adventures when you get the Second Rainbow Adventures tape. The three bonus games are Castle Thuudo, by Carmen D. Michele; Halls of Dungeon Death, by Eric and Mark Riel; and Caves of Kalakh, by Jane Fisher — programs with listings too lengthy to include in the book. Save yourself hours of typing listings. Load these great Adventures into your computer and run them!

The Second Rainbow Adventures Tape is only $13.95.

The tape is an adjunct and complement to the book. Even if you buy the Second Rainbow Adventures Tape, you'll need the book for the introductory material and loading instructions.

Keep your Rainbow Bookshelf up-to-date!
See Page 221 for additional Rainbow Bookshelf offerings.

☐ Please send me The Second Rainbow Book Of Adventures for $13.95*

☐ Please send me The Second Rainbow Adventures Tape for $13.95

Name ______________________
Address ______________________
City ______________ State ________ ZIP ________
☐ My check in the amount of ________ is enclosed.*
Please charge to my: ☐ VISA ☐ MasterCard ☐ American Express
Account Number ______________ Exp. Date ________
Signature ______________________

Mail to: The Second Rainbow Book of Adventures,
The Falsoft Building, P.O. Box 385, Prospect, KY 40059
To order by phone (*credit card orders only*) call 1-800-847-0309,
8 a.m. to 5 p.m. EST. For other inquiries call 1-502-228-4492.

*Add $1.50 shipping and handling per book. Outside the U.S., add $4. Allow 6-8 weeks for delivery. Kentucky residents add 5% sales tax for book and tape. In order to hold down costs, we do not bill. **U.S. currency *only*, please.**

The Rainbow Bookshelf™

The Ultimate Color Computer

Enhancements for Productivity from HJL Products

HJL
PRODUCTS
Div. of Touchstone Technology Inc.
12" MONOCHROME
GoldStar
Quick Basic Plus
USER'S GUIDE
NUMBERJACK
The HJL Numeric Keypad
SPACE BAR

To achieve maximum productivity with your Color Computer, you have to make it as easy as possible to get information into and out of the system.

This is why we developed the HJL family of high-performance enhancements for ALL MODELS of the Color Computer.

The Keyboard - $79.95
The overwhelming favorite of serious Color Computer users worldwide, the HJL-57 keyboard has the smooth, consistent feel and reliability you need for maximum speed with minimum input errors. Includes 4 Function Keys and sample function key program. Installs in just a few minutes with no soldering.

The Numeric Keypad - $89.95
The NumberJack is a self-contained, cable-connected keypad for heavy-duty number-crunchers. Besides the number keys, it has all the cursors, symbols and math keys, including autoshifted (one-touch) ADD and MULTIPLY. Comes complete with 3-foot cable and all necessary connectors for quick and easy installation without soldering.

The Monitor Adapter - $25.95
This universal driver works with all monochrome monitors, and is easily installed without clips, jumpers or soldering (except in some later CoCo 2s with soldered-in video chips). Here's crisp, clear, flicker-free monitor output with all the reliability you've come to expect from HJL Products.

The Monitor - $89.95
The GoldStar high-resolution amber monitor brings you the monochrome display that's preferred by most computer professionals today. Once you've used it you'll never connect your computer to a TV set again. The 12-inch diagonal CRT has an etched non-glare faceplate. (Requires adapter sold below)

The BASIC Utility - $25.95
Quick Basic Plus, a high-performance programming utility, can be used with any color computer that has four function keys. 26 pre-defined BASIC statements, 10 user-defined macros at a time (you can save as many sets of macros as you like), automatic line-numbering, word wrap, global search, and instant screen dump to printer, make this software the BASIC programmer's dream come true. Comes with re-legendable 3-way reference chart. Specify disk or cassette.

The HJL Warranty
Every HJL product comes with a full, one-year warranty and the exclusive HJL 15-day unconditional guarantee (except software).

Pick a Pair & Save 15%
Now, for a limited time, we'll give you 15% off the price of any two or more products shown here. Just mention this ad when you order.

Ordering Information: Specify model (Original, F-version, or CoCo 2 Model Number). Payment by C.O.D., check, MasterCard, or Visa. Credit card customers include complete card number and expiration date. Add $2.00 for shipping, 3.50 to Canada; except monitors (call for shipping charges before ordering monitors). New York state residents add 7% sales tax. **Dealer Inquiries Invited**

Call Now, Toll Free

1-800-828-6968

In New York 1-800-462-4891
International calls: 716-235-8358

HJL
PRODUCTS
Div. of Touchstone Technology Inc.

955 Buffalo Road • P.O. Box 24954
Rochester, New York 14624

SemiGraphics Support Utility Unleashes 'Hidden' Abilities

The *SemiGraphics Support Utility*, available for 16K ECB CoCos on either disk or cassette, expands Extended Color BASIC to allow direct access to the semigraphics modes.

What's a semigraphics mode? You can go through Tandy's *Color BASIC, Extended Color BASIC*, and *Disk System* manuals and still not know a thing about semigraphics. Why? Because four of these five semigraphics modes are not supported by any version of CoCo BASIC. So how do you find out about them? The RAINBOW is a source, and so is William Barden's book, *Color Computer Graphics*.

What you'll find is that these semigraphics modes are built into a chip in the CoCo called a Video Display Generator. One of the modes (SG 4) is accessed by Color BASIC as the Lo-Res graphics through the `SET`, `RESET` and `POINT` commands. The remaining four modes (SG 6, SG 8, SG 12 and SG 24) are called the forgotten modes. When the various versions of CoCo BASIC were developed, these capabilities were, for one reason or another, not supported. Without BASIC support, these modes are cumbersome to use. Various numbers must be `POKE`d into memory locations to select color, or set or reset the various picture elements. A pain, to say the least.

The advantage of the semigraphics modes over the true graphics modes is that all eight colors can be used on one screen with a fairly fine resolution of 64 by 192. The semigraphics modes also lend themselves to intermixing text and graphics on the same screen.

Are these advantages worth the hassle involved in figuring out all of those `POKE`s? To the average programmer, probably not. Not, that is, without *SemiGraphics Support Utility*.

SemiGraphics Support Utility becomes part of ECB, adding 18 commands and four functions to the programming language. These new commands and functions can be freely intermixed with all of the ones you're already used to. The graphics require allocation of video pages, much like ECB graphics. Various semigraphics modes can be assigned to various sets of pages. Any element (based on X and Y coordinates) can be set to any color. *The SemiGraphics Support Utility* commands, similar to their ECB counterparts, allow the user to draw lines (solid, dotted or dashed), boxes, circles, ellipses or arcs. Figures thus created can be filled with any color using the command parallel to ECB's `PAINT`.

The figures can be redrawn at other coordinates, or moved to other parts of the screen or even to other screens not currently displayed. These features should be of interest to anyone creating animation. As the demo program displays, smooth and rapid movement of screen figures can be produced. Figures produced in the highest resolution mode can be "scaled down" to lower resolution modes without altering X/Y coordinates. Video pages can also be copied from one location in RAM to another.

Since the alphanumeric mode is one of those accessible by *SemiGraphics Support Utility*, text and graphics can be mixed on a single screen. In addition to the graphics capabilities, the utility allows the generation of either one-bit or six-bit sounds. The user supplies what is called a "frequency delay" and an "envelope delay" for these sound-producing commands. Neither of these terms is defined in the documentation, so expect to do a little experimenting. The six-bit version allows control of the sound volume. With practice, you can produce some pretty bizarre sounds.

The user is able to print his graphics creations to a dot-matrix printer. I was unable to review this aspect of the utility because the only kinds of printers supported are the Gemini-10X and Epson. Pictures included in the documentation indicate that the various screen colors are represented on the printout by shades or patterns of gray. I would like to see this utility with support for more printers.

The documentation consists of 61 pages. I have already pointed out what I feel to be a shortcoming in documentation for the sound commands. The remainder of the documentation shares this shortcoming: brevity. To give credit where credit is due, however, *SemiGraphics Support Utility* is a very complex system and would not be easy to document. Don't expect to sit down and immediately produce stupendous semigraphics: This system takes some work. I would compare learning it to learning ECB's graphics capabilities. Included in the documentation are short programming examples, illustrating all the features. On the disk (or tape) with the utility is a demo program in which *SemiGraphics Support Utility* struts its stuff. The listing of this demo is provided. I strongly urge the user to type in the example programs, run the demo and go over the listing as a learning experience.

One of the first applications I thought of for this program was the creation of title screens and the like for my programs. Remember though, *SemiGraphics Support Utility* must be in place on the computer running the program, which could cause exportation problems.

Extended Color BASIC is great for graphics. Have you ever found yourself wishing you could use more than four colors? Or have graphics and text on the same screen? Then I would definitely recommend the *SemiGraphics Support Utility*. Check the price — I consider it a bargain few graphics programmers should pass up.

(Micro Computer Systems, 1404 Sunset Dr., Friendswood, TX 77546, cassette $14.95, disk $17.95)

— Stanley Townsend

Hint . . .

Upside-Down Loading

If you've been having problems with I/O Errors when loading programs from cassette, try reloading with the cassette recorder placed upside down. It may not be technically refined, and it may not work, but when faced with the dreaded I/O it's worth a try. Besides, Rick Bullon, who suggested this method, says it works for him 90 percent of the time.

Big League Baseball Stats For Your League!

If you're a coach, player or baseball fan, you'll love **Baseball Statpak!** This series of programs will keep track of a team or an entire league, with incredible screen displays and printouts.

Batter's Scorecard tracks AB, Hits, Runs, Walks, RBI's, HR's, SO's, Errors and On-Base Percentage for up to 180 players! Pitcher's Scorecard tracks Games, IP, Hits, Walks, Runs, SO's and ERA for up to 60 pitchers. Team Scorecard will keep standings for an entire league!

Lightning-fast machine language sort on any stat makes this an invaluable coaching tool! You've seen these stats for the Big Leagues in your newspaper. Now you can have them for your league, whether it's Little Leauge, High School, College, or Amateur Softball! **Baseball Statpak** is available on 16K Tape or 32/64K Disk. Extended Basic Required. Only $34.95, on tape or disk.

The Handicapper

Use your **Color Computer** to improve your performance at the track! Separate 16K programs for **Thoroughbred, Harness** and **Greyhound** racing rank the horses or dogs in each race quickly and easily. All the information is readily available from the *Racing Form*, harness or dog track program.

Thoroughbred factors include speed, distance, past performance, weight, class, jockey's record, beaten favorite and post position. **Harness factors** include speed, post position, driver's record, breaking tendencies, class, parked-out signs and beaten favorite. **Greyhound factors** include speed, past performance, maneuvering ability, favorite box, class, kennel record, beaten favorite and breaking ability.

Complete instructions and wagering guide included. You can buy a more expensive handicapper, but you can't buy a better one! **Thoroughbred, Harness** or **Greyhound Handicappers** $39.95 each on tape or disk. Any two for $59.95 or all three for $79.95.

Federal Hill Software
8134 Scotts Level Rd.
Baltimore, MD 21208

Toll Free Orders 800-628-2828 Ext. 850
For Information 301-521-4886

The CoCo Health Consultant: *Health Programs*

Interested in knowing whether your diet is providing the proper amounts of vitamins, minerals and protein? How about suggestions for supplements for certain physical ailments? Or maybe you just want to check your biorhythm for the next few weeks. These are all part of a package from Health Software called *Health Programs*. The package includes; "Deficiency Symptoms and Food Sources for 21 Different Nutrients," "Nutritional Therapy for 30 Different Ailments," "Pmode 4 Graph for 3-Week Biorhythm," "Text Mode Graph for 4-Week Biorhythm," and "Hypoglycemia Symptoms, Tests and Diet Recommendations."

The largest part requiring a 32K system, is the Diet program. To quote the introductory display, "Select from a list of 181 foods and see how much protein, calories, 11 vitamins and nine minerals are contained in your selections. The totals are individually compared to your RDAs if under age 19, or your MDRs if over age 18. It has 14 different RDA and MDR categories and adjusts for pregnant or lactating women 18 to 45 years old."

The package includes a two-page list of food items with codes and units of measure. To use the Diet program, enter age, weight, sex, and, if female, whether pregnant or not. The user is then asked if he/she uses vitamin supplements and, if so, the quantities of each. Then, using the list supplied, the user enters the quantities of food consumed for a full day up to 30 items. The program then displays the previously mentioned analysis of protein, vitamins and minerals.

The programs are well-written and perform as claimed. They are written in BASIC and come on tape or disk. In the tape version, the long Diet program is loaded using the high speed `POKE` to speed up the loading — even at that it takes about one and a half minutes to load. This program is too large to use with a disk even if the disk `PCLEAR 0` is used. However, there is another copy of the Diet program on the 'B' side of the tape which can be loaded onto a disk.

Although the programs are easy to use, there are a few suggestions that could result in an even friendlier package. Some of the programs move to another screen simply by pressing ENTER while others require the entry of a specific number. Sometimes the choice is 1 or 2 and other times it's 5 or 6. There should be more consistency here. An improvement my wife would like to see would be the ability to enter three days' worth of diet instead of one to give a more representative average. The analysis takes four full screens to display and it would be nice to be able to direct this to a printer. Finally, the food list supplied with the package should also be included as a file so that if the original is lost or worn, a new one can be printed.

Is it worth buying? If you're interested in meeting your MDRs, the analysis can be very useful and the other programs in the package provide interesting information. The $10 price is certainly quite fair for what you get.

(Health Software, 1521 Lancelot, Borger, TX 79007, cassette or disk $10)

— James G. Kriz

Software Review

Line Editor Works Well with Compilers

Line Editor is a full-screen editor for Assembly and PASCAL source code. It edits text files that can then be used with Assembly or PASCAL compilers. It requires at least 16K Extended BASIC and uses the Hi-Res graphics to display a 51 by 24-column screen with true upper- and lowercase characters. The program features auto-repeating keys, fast screen routines, and built-in help screens to remind you of the different commands. Although it is sold on cassette, *Line Editor* works with both cassette and disk. The editor is in machine code, but has a BASIC loader which allows the user to make some modifications. All input and output is in ASCII so as to be compatible with other programs.

Line Editor is not compatible with *EDTASM+* type assemblers nor is it designed to edit BASIC programs.

At first, I couldn't get it to work. After following the instructions without success, I discovered there was a simple error in Line 0 of the BASIC loader. After fixing that line the program runs fine.

The editing capabilities of *Line Editor* compare well with other text editors with similar command options.

The manual is eight pages long and covers all the commands and operations of the program with suggestions for use and modifications. Unfortunately, the manual contains typos and mistakes and the help screens in the program also contain errors.

Commands sometimes work erratically with lines of text that contain only one or two characters. Editing is done primarily in an overstrike mode and inserting text is awkward. A line of text is restricted to 51 characters. If you exceed this limit, not only is anything past the 51st character hidden, but the commands sometimes act unpredictably.

There is no way to send files to a printer; a major shortcoming. Though you might be able to overcome this by modifying the BASIC loader, you cannot break out of the editor, modify the loader and then rerun the program. The text is lost if the program is re-entered with the RUN command. There is no way to re-enter the editor after performing a write to disk or cassette. The program simply ends. This makes it difficult to make saves periodically as you type in a long text file. Although you can append stored files to the text in memory, there is no way to save only a portion of the text in memory.

This program works well for its intended purpose but is of somewhat limited use. It is only for those with an assembley or PASCAL Compiler but no text editor to create files to use with them. Although it has a very reasonable price, *Line Editor* should have been debugged with more care. If you need such a program, *Line Editor* is for you.

(CMD Micro Computer Sevices Ltd., 10447 124 Street, Edmonton, Alberta, T5N 1R7, distributed in the U.S. by Saguaro Software, P.O. Box 1864, Telluride, CO 81435, cassette $17.95 plus $2 S/H)

— James Ventling

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE

Back Issue Availability

Back copies of many issues of **THE RAINBOW** are still available.

All back issues sell for the single issue cover price. In addition, there is a $3.50 charge for the first issue, plus 50 cents for each additional issue for postage and handling if sent by United Parcel Service. There is a $5 charge for the first issue, plus a $1 charge for each additional issue on orders sent by U.S. Mail. UPS *will not* deliver to a post office box or to another country.

Issues July 1981 through June 1982 are available on white paper in a reprint form. All others are in regular magazine form. VISA, MasterCard and American Express accepted. Kentucky residents please add 5 percent state sales tax. In order to hold down costs, we do not bill and no C.O.D. orders are accepted.

Due to heavy demand, we suggest you order the back issues you want now while supplies last.

To order, just fill out the form on the next page and mail it with your payment to:

THE RAINBOW
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

For greater convenience, order RAINBOW Back Issues through the shopping area of the CoCo SIG of Delphi!

BACK ISSUE ORDER FORM

(See overleaf for instructions.)

(Payment must accompany back issue orders. We do not bill.)

☐ Please send me the following back issues:

NO.	MONTH YEAR		PRICE	
		VOLUME 1		
1	JULY '81	PREMIER ISSUE	$2.00	☐
2	AUG. '81		$2.00	☐
3	SEPT. '81	EDUCATION	$2.00	☐
4	OCT. '81	PRINTER	$2.00	☐
5	NOV. '81		$2.00	☐
6	DEC. '81	HOLIDAY	$2.00	☐
7	JAN. '82		$2.00	☐
8	FEB. '82		$2.00	☐
9	MAR. '82		$2.50	☐
10	APR. '82		$2.50	☐
12	JUNE '82		$2.50	☐
		VOLUME 2		
11	JUNE '83	PRINTERS	$2.95	☐
12	JULY '83	ANNIVERSARY	$2.95	☐
		VOLUME 3		
1	AUG. '83	GAMES	$2.95	☐
2	SEPT. '83	EDUCATION	$2.95	☐
3	OCT. '83	GRAPHICS	$3.95	☐
4	NOV. '83	DATA COMM.	$3.95	☐
5	DEC. '83	HOLIDAY	$3.95	☐
8	MAR. '84	BUSINESS	$3.95	☐
9	APR. '84	GAMING	$3.95	☐
10	MAY. '84	PRINTER	$3.95	☐
11	JUNE '84	MUSIC	$3.95	☐
12	JULY '84	ANNIVERSARY	$3.95	☐
		VOLUME 4		
1	AUG. '84	GAMES	$3.95	☐
2	SEPT. '84	EDUCATION	$3.95	☐
3	OCT. '84	GRAPHICS	$3.95	☐
4	NOV. '84	DATA COMM.	$3.95	☐
5	DEC. '84	HOLIDAY	$3.95	☐
6	JAN. '85	BEGINNERS	$3.95	☐
7	FEB. '85	UTILITIES	$3.95	☐
8	MAR. '85	BUSINESS	$3.95	☐
9	APR. '85	SIMULATIONS	$3.95	☐
10	MAY '85	PRINTER	$3.95	☐
11	JUNE '85	MUSIC	$3.95	☐
12	JULY '85	ANNIVERSARY	$3.95	☐
		VOLUME 5		
1	AUG. '85	GAMES	$3.95	☐
2	SEPT. '85	EDUCATION	$3.95	☐
3	OCT. '85	GRAPHICS	$3.95	☐
4	NOV. '85	DATA COMM.	$3.95	☐
6	JAN. '86	BEGINNERS	$3.95	☐
7	FEB. '86	UTILITIES	$3.95	☐
8	MAR. '86	BUSINESS	$3.95	☐
9	APR. '86	HOME HELP	$3.95	☐
10	MAY '86	PRINTER	$3.95	☐
11	JUNE '86	MUSIC	$3.95	☐

RAINBOW INDEX A complete index to our first three years, July 1981 through June 1984, is printed in its entirety in our July 1984 issue. Separately bound copies are also available. $2.50 ☐

Note: Our Fourth Year Index, including an index to all editions of RAINBOW ON TAPE, is included in the July 1985 issue.

TOTAL __________

KY RESIDENTS ADD 5% __________

U.S. MAIL CHARGE __________
SHIPPING & HANDLING
U.P.S. CHARGE __________

TOTAL AMOUNT ENCLOSED __________

Name ____________________

Address ____________________

City __________ **State** _____ **ZIP** _______

☐ **Payment Enclosed, or charge to my:**

☐ **VISA** ☐ **MC** ☐ **AE**

CARD # ____________________

EXPIRATION DATE ________ **PHONE #** ________

SIGNATURE ____________________

Software Review

Super Tutor — A Typing Tutor for Young Children

Super Tutor is designed to teach letter and number recognition to children ages 2 to 6. With the aid of parents, *Super Tutor* can be expanded to teach spelling.

The program arrived on disk. Actually there are four versions of *Super Tutor* on the disk. *Super Tutor* is divided into three learning levels. Each learning level has its own program. In addition, there is a main program that runs all three levels. The main program allows you to quickly switch between learning levels.

Level one teaches letter and number recognition. Each time a letter or number key is pressed the letter or number is drawn on the screen in large block form. The letters and numbers are drawn on a black background and colored white. Up to five rows of eight characters each can be displayed at one time. When a key is pressed the parent should tell the child the name of the letter or number. After a letter or number is displayed a short melody is played, which is usually a couple of notes designed to get the child's attention.

Level two teaches the child to recognize a letter or number on the keyboard. A random character is displayed and the child presses the appropriate key to cause the character to be displayed again. Nothing happens to the display until the proper character is pressed. When the child gives the proper response, the character is echoed to the screen and a short tune is played. In level two you can select training on letters or numbers only, or both letters and numbers.

Level three can be used to teach spelling. At the start of level three, enter the largest word length to be displayed, which can be from one to eight letters. In level three, words are displayed on the screen. The child must press each letter of the word in the proper order. When a correct letter is pressed the letter is displayed. When a word is entered properly an ear-catching melody is played. The parent must work along with the program to teach the child word pronunciation and spelling.

The *Super Tutor* package includes two pages of operating instructions. The instructions are straightforward and easy to understand. Included with the operating instructions is information on modifying and adding words to level three. The *Super Tutor* programs are written in BASIC. Words used in level three are located in lines 7000 and above. Up to 250 words can easily be placed in the data dictionary. *Super Tutor* comes with 50 words in the dictionary. You must know how `DATA` statements are written to modify or add words to the dictionary.

Super Tutor is easy to operate and performs exactly as described in the instructions. The author's telephone number is included in the instructions. Parents need to participate in the training in order for *Super Tutor* to work effectively. If you are looking for a program to teach young children the alphabet, numbers and early vocabulary, *Super Tutor* may fit the bill.

(Challenger Software, 42 Forth St., Pennsburg, PA 18073, 32K ECB, tape or disk $24 includes S/H)

— Gabriel Weaver

Educational *Biosphere* is Fun and Challenging

Imagine cruising in a spaceship, as captain of *Arkworld*, and learning about a dying planet below. This is much more than a game. In *Biosphere*, the challenge is to save doomed alien life-forms as you fly about the galaxy. You must remember that your decisions will affect the ecology of the planet. It can be a very educational experience and is not for those who wish a shoot-'em-up action game.

Biosphere is a complex ecological Simulation that lets you decide how to populate the dying colony of each planet you land on. Your ship is filled with 100 plants and 100 animals, each with their own characteristics. You can choose from these or experiment with genetic engineering to compose as many as 10 new life-forms. You must examine the planet's environment, and then determine what combination of plants and animals to beam down.

Educators will marvel over the detail of the ecological system, and the glossary page. The manual is well-written and provides helpful insights into a successful Simulation.

The program is also well-written and user friendly. It employs eight icons to display the main actions. The left- and right-arrow keys select the icon/functions. The up- and down-arrow keys scan through the information. A display area between the icons uses words and pictures to depict the information. The bottom half of the screen simulates the control panels, computers and ship holding cells.

Each *Biosphere* Simulation is different since the native Colony is randomly generated. When the first icon flashes, information about the colony is displayed. The number of inhabitants varies depending upon your success in providing the correct balance of necessary ingredients.

Using the Environmental icon, information about the planet's temperature, humidity, wind direction and gasses present on the surface is displayed. During the Simulation, these factors change as the balance of nature is affected.

The Animal Manifest is next. Use the up and down arrows to scroll through each of the 100 animals in the ship's hold. Biological information is shown: Animal Name (listed one at a time, in alphabetical order), Order (what it eats), Intake/Expel (gasses breathed), Weight range, Temperature and Humidity range it can live in and Quantity. The Quantity is the only random factor from game to game (all other characteristics remain constant). As each animal is displayed, determine how many (if any) you want to send to the planet. By studying the current environment, and that which will support the native life form, you are better prepared to save the dying planet.

The next icon, the Plant Manifest, works the same way as the Animal Manifest.

Genetic Engineering is next. If you choose to create an animal or plant, scroll through the Plant/Animal manifest lists. When you have chosen the two animals or plants you want to draw from, they appear in two boxes, and between them, your mutation: The Genetic1 lifeform appears! Five plants and five animals can be created this way.

The Window View is the view of the planet. You see a parade of animal life and growing plants. The author claims, "The beautiful sight of that teeming lifescape is the thrill that makes you glad you chose to be an ecologist." However, the view seems to start from the beginning each time, rather than continue from where it left off.

The Time Control icon displays the number of days the Simulation has been running, as well as the modes: normal, accelerated or hyper. In normal time, you make the choices and set up the Simulation. Printouts can also be made. In Accelerated time, one planetary day passes every 20 seconds. You can test the selections and make adjustments. Hyper time runs the Simulation at one day per second. Once in hyper time, the Simulation must run its course until all native animals have perished, or the ecology created proves to be stable by supporting the colony for 65,000 days. (This could take up to 18 hours to complete. But, until your decision-making skills are finely honed, the game is usually much shorter.)

The final icon is Archives. You can save a current Simulation, retrieve an already-created Simulation, or list the directory of previously saved Simulations. This allows saving choices before going into hyper time, and allows replaying the Simulation after loading and changing the quantities to better your performance. It is recommended to save a record when beginning the simulation and several more times before entering hyper time. By looking at the environmental changes and observing the native colony's head count, you can monitor the effects of your actions.

Playing the game is easy. However, winning is another story entirely! The tips the author suggests are timely. A good strategy is to print out the entire animal and plant manifests so that you can learn about and refer to the wide range of possible combinations. In a school setting (or two-computer family), the use of a database on another computer would be a great way to choose the best life-forms to fit the needs of the simulation.

There is no suggested age range for this program. However, I would recommend it for middle-school age and older. Those who work with this Simulation will gain insight into the ecological principles that govern our own relationship to the planet Earth.

Required is 64K Color Computer, (color TV recommended) and one drive. *Biosphere* loads with the DOS command, or the BASIC program provided to start OS-9 on a Color Computer with a BASIC ROM prior to 1.1.

(Tandy Corp., available in Radio Shack stores nationwide, Cat. No. 26-3280, disk $29.95)

— Dale Shell

CoCo Trend

Computerware

Name brand software
at least 20% off
suggested retail.

Prickly Pear

15001 Glory Dr. Huntsville, AL 35803
(205) 880-COCO (2626)
Call or write for free catalog.

Software Review

French Package
Sharpens Language Skills

It's been quite a while since I wrassled with French irregular verbs in high school and in college. The verbs won. Always. Every match. Although I never passed a French exam in my scholastic life, I always merited a 'C' because I tried so hard. I just never mastered the art of thinking in another language.

Here at THE RAINBOW, letters from our French-speaking readers land on my desk for translation. I still try as hard as I can and I'm still earning a 'C'. Perhaps if I had had a tool like *French Package* by David M. Compton to study with, I wouldn't have to live with the memory of my professor's parting words to me, "Monique, you sound like a child. You guess too much. It is amazing how much you guess right, but you *must learn.*"

French Package requires 32K and comes on a non-protected disk so that backups for the user's convenience can be made. This program does not teach French; it is designed to help students reinforce material already studied. The documentation is three pages long and describes the programs within *French Package.*

From the menu, students may choose a quiz on the verbs aller, avoir, boire, s'asseoir and devoir, and from within each verb choose any of the 11 tenses or moods. The declensions are shown and the student responds with the correct verb form. Next are three categories of regular and irregular verbs along with their tenses and moods (including my personal boogeyboo, the subjunctive). Past participles, future and conditional are among the choices. The student is presented with the infinitive and asked for the correct form.

There are quizzes on both relative pronouns and object pronouns. This was my second favorite part. I always knew the difference between "que" and "qui" (I just never placed them correctly in the sentence, so no credit). Vocabulary is tested and stumped me royally when "fertile" was rejected as the response to "fecond." There is a multiple choice test in English on French civilization and a multiple choice test in French on French history. That was my favorite part along with the quiz on the comparative and superlative forms of adjectives and adverbs — they were the only rounds in which I earned perfect scores on the first tries.

There are quizzes and reviews on "si" clauses, forms of "quel" and "lequel," interrogative pronouns and a test on the student's knowledge of imparfait versus passe compose (in which I proved once again, I really am an animal and can live and deal only with now). There are quizzes on regular verbs in the present tense and I was able to salvage some of my pride on those and the quizzes on numbers from one to 100.

Mr. Compton has included instructions to modify *French Package* so it can match different textbooks more closely. I believe if I had had a CoCo and *French Package* when I was in school, I could have spared my classmates all those dumb puppet shows I wrote and performed and probably could have passed my courses in the regular manner. All in all, *French Package* is a worthy learning aid and delighted me with how much I can still guess right.

(David M. Compton, 252 N. Main Street, Suffield, CT 06078, requires 32K, disk $39.95 plus $3 S/H)

— Monica Dorth

WORKBASE

BUSINESS SOFTWARE

$ PORTFOLIO $

BUSINESS DATABASE SYSTEMS

★ Reviewed in HOT CoCo Dec. 1984 & RAINBOW Feb. 1985 ★

- **DATABASE MANAGEMENT** — define, reorganized & update a database
- **SPREAD SHEET** — calculations to update database
- **REPORT MODULE** — customized report formats with headings & totals
- **WORD PROCESSOR** — merge database with custom letters, labels, & reports
- **MACRO PROCEDURES** — store any report calculations with sorts & selections
- **UTILITIES** — generate, merge, summarize, & summarize-post
- **216 PAGE MANUAL WITH STEP-BY-STEP TUTORIAL**
- **WORKBASE I** (600 Records) $49.95 — **WORKBASE II** (1200 Records) $59.95

BUSINESS APPLICATION PACKAGES

- **READY-TO-USE** — 50-page manual, database, calculations, & reports
- **SELF-CONTAINED** — purchase & use any package independently
- **BUILT-IN DATABASE FUNCTIONS** — selectively display/print records
- **COMPREHENSIVE** — all major accounting functions addressed
- **EASY TO USE** — all packages are entirely menu driven
- **EXPANDABLE** — use any application database with WORKBASE DATABASE
- **PROVEN** — currently used in businesses, churches, and accounting firms
- **COST EFFECTIVE** — $29.95 per package — $24.95 when 2 or more purchased

★ INVENTORY CONTROL
★ SALES ORDER ENTRY
★ ACCOUNTS PAYABLE
★ PAYROLL
★ RENTAL PROPERTY
★ ACCOUNTS RECEIVABLE
★ GENERAL LEDGER
★ PURCHASE ORDER ENTRY
★ CHURCH MEMBERSHIP

ALL SOFTWARE REQUIRES 32K/64K TRS-80 CoCo & 1 DISK DRIVE

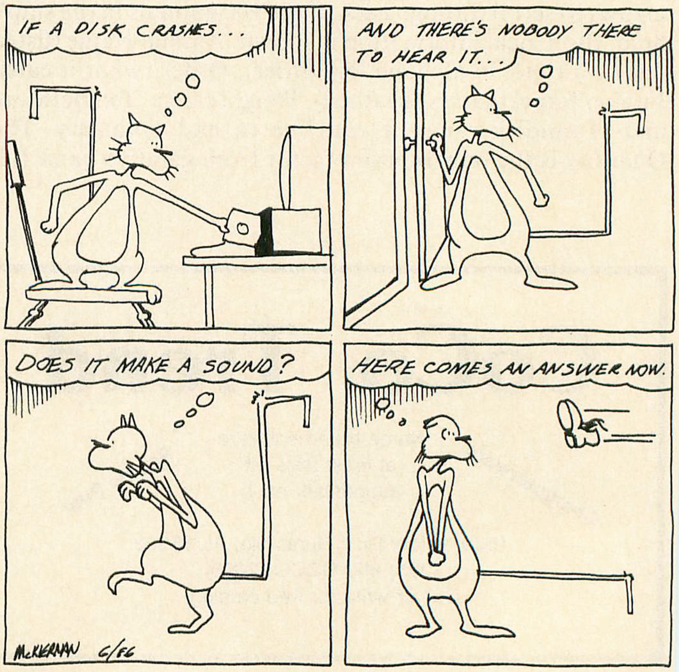
★ *FREE CATALOG AVAILABLE* ★

ORDERING: CHECK, MONEY ORDER, COD, MASTERCARD, VISA

Price includes shipping in USA
NC residents add 4.5% sales tax

WORKBASE DATA SYSTEMS
P.O. Box 3448
Durham, NC 27702
Call Toll Free 1-800-334-0854 ext 887
(919) 286-3445 NC Residents only

CoCo Cat


IF A DISK CRASHES...
AND THERE'S NOBODY THERE TO HEAR IT...
DOES IT MAKE A SOUND?
HERE COMES AN ANSWER NOW.
McKERNAN 6/86

XSCREEN Gives High Resolution for OS-9

Have you ever wanted something besides the 32 characters per line on a green screen for your OS-9 system? Unhappy with inverse video instead of lowercase letters? Well here it is, and at an affordable price.

XSCREEN is a high resolution screen package for the OS-9 operating system of the Color Computer. Choose from 51, 64 or 85 characters per line. The display can be white or green characters on a black background, or black characters on a white or green background. All of these combinations have 24 lines per page. *XSCREEN* also has real lowercase letters.

The 85 characters per line is nearly impossible to read on a television. However, it is readable on a monitor. The 64 characters per line is available in two character sizes; wide and narrow. The wide characters seemed easier for me to read, but judge this for yourself. At 64 characters per line with either the wide or narrow characters, my eyes got tired after 15 minutes of work on the television. The 51 characters per line was easy to work with for long periods of time on a television or a monitor.

After *XSCREEN* is copied to the command directory, activate it by typing `XSCREEN`. You are presented with a menu for selecting the characters per line, and the foreground and background colors. It then returns to OS-9. If you need to change to a different style screen or want to quit *XSCREEN*, return to the menu by pressing the CLEAR and BREAK keys at the same time. If you quit *XSCREEN* and want the high resolution screen back again, reboot the system before executing *XSCREEN* again. This is stated in the manual in large bold letters.

XSCREEN uses about 12K bytes of user memory. This leaves about 28K bytes of memory for applications. If using BASIC09, you will have about 7,000 bytes of memory for your application program. With the OS-9 editor you will have just over 24K bytes of memory for the text you are editing.

All of the OS-9 display functions are supported by *XSCREEN*. In fact, *XSCREEN* has additional display functions which make it much easier to write screen editing routines. These codes allow erasing to end of line, turning the cursor on or off, scrolling down and erasing to end of screen. There are also several codes to change the foreground and background colors of the display and change the number of characters per line. To get these additional display codes, *XSCREEN* uses some of the OS-9 graphics display codes. This may sound like a problem if you have existing programs that make use of these codes. It is not, and here is why. *XSCREEN* does not use the standard output /TERM. Instead it uses a driver called /HI. To perform the standard OS-9 graphics display functions, direct the display command to /TERM. OS-9 will process the display code the same as if *XSCREEN* was not present.

I tried *XSCREEN* with OS-9 version 2.0.0. It did not operate predictably. I hope the makers of *XSCREEN* will make the necessary changes so it will work properly with version 2.0.0.

XSCREEN is well worth the price. It is nice to be able to get more than the 32 characters per line. If you cannot afford 80-column hardware, *XSCREEN* is the way to go.

(Microtech Consultants Inc., 1906 Jerrold Ave., St. Paul, MN 55112, disk $19.95)

— Mike Piotrowski

Hint . . .

Data Finder

Have you ever gone through your tapes or disks and found a data file that you couldn't identify? Well, I have, and it's a pain when you can't load it without the program and you can't find out what program it came from. Here is a program to solve your problems. Simply type in and run the program, and when it finds the file it will put it on the screen or on paper if you have a printer.

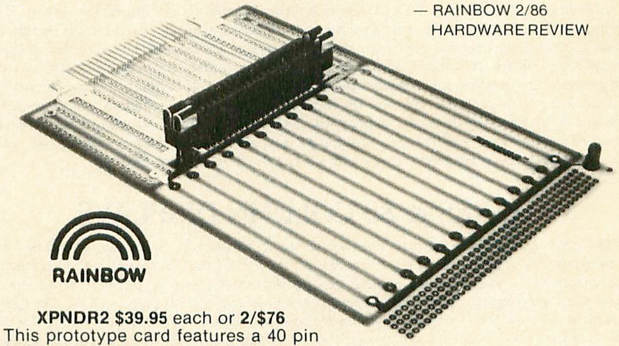
```
20 CLS:INPUT"WHAT IS THE NAME OF THE
DATA FILE";DF$
30 OPEN "I",#1,DF$
40 INPUT#1,D$
50 PRINT D$
60 IF D$="EOF" OR D$=""THEN 80
70 GOTO 40
80 CLOSE #1
```

If you want to load a data file from tape, change *#1* to *#-1* in lines 30, 40 and 80. If you want to print out the data, change line 50 to *PRINT#-2, D4.*

Chris Stevenson
Crocker, MO

"XPNDR2 and SuperGuide - an Ideal Expansion Card Set"

— RAINBOW 2/86
HARDWARE REVIEW



RAINBOW

XPNDR2 $39.95 each or **2/$76**
This prototype card features a 40 pin connector for projects requiring an on-line disk system or ROM paks. The CoCo signals are brought out to wire-wrap pins. Special gold plated spring clips provide reliable and noisefree disk operation plus solid support for vertical mounting of the controller. The entire 4.3×7 inch card is drilled for ICs. Assembled, tested and ready to run.

XPNDR1 $19.95 each or **2/$36**
A rugged 4.3×6.2 inch bare breadboard that brings the CoCo signals out to labeled pads. Both XPNDR cards are double-sided glass/epoxy, have gold plated edge connectors, thru-hole plating and are designed with heavy power and ground buses. They're drilled for standard 0.3 and 0.6 inch wide dual in-line wirewrap sockets; with a 0.1 inch grid on the outboard end for connectors.

SuperGuide $3.95 each
Here is a unique plastic insert that aligns and supports printed circuit cards in the CoCo cartridge port. Don't forget to **ORDER ONE FOR YOUR XPNDR CARDS**.

Included with each XPNDR card are 8 pages of APPLICATION NOTES to help you learn about chips and how to connect them to your CoCo.

VISA master charge

To order or for technical information call:

(206) 782-6809
weekdays 8 a.m. to noon

We pay shipping on prepaid orders. For immediate shipment send check, money order or the number and expiration date of your VISA or MASTERCARD to:

ROBOTIC MICROSYSTEMS

BOX 30807 SEATTLE, WA 98103

"The CBASIC Compiler"

Now anyone can create fast efficient Machine Language Programs Easily and Quickly without having to use an Editor/Assembler

CBASIC is a fully integrated, easy to use Basic program Editor and Compiler package. CBASIC is 99% syntax compatible with Disk Extended Color Basic programs, so most Basic programs can be loaded and compiled by CBASIC with little or no changes required. The compiler is an optomizing two-pass integer Basic compiler that can convert programs written in Disk Extended Color Basic into 100% pure 6809 Machine Language programs which are written directly to disk in a LOADM compatible format.

The programs generated by the compiler can be run as complete stand alone programs. A built-in linker/editor will automatically select one and only one copy of each subroutine that is required from the internal run-time library and insert them directly in the program. This eliminates the need for cumbersome, often wasteful separate "run-time" packages.

CBASIC WAS DESIGNED FOR BOTH BEGINNING & ADVANCED USERS

CBASIC is a Powerful tool for the Beginner or Novice programmer as well as the Advanced Basic or Machine Language programmer. The Beginner or Novice programmer can write and compile programs without having to worry about Stack Pointers, DP registers, memory allocation, and so on, because CBASIC will handle it for you automatically. All they have to do is write their programs using the standard Basic statements and syntax. For the advanced Basic and Machine Language programmers, CBASIC will let you take command and control every aspect of your program, even generating machine code directly in a program for specialized routines or functions.

CBASIC adds many features not found in Color Basic, like Interrupt, Reset, and On Error handling. It also has advanced programming features that allow machine level control of the Stack and Direct Page registers, variable allocation, automatic 64K RAM control, program origin and even multiple origins. It can even have machine language code generated within a program that executes just like any other Basic program line.

FULL COMMAND SUPPORT & SPEED

CBASIC features well over 100 Basic Commands and Functions that fully support Disk, Tape, Printer and Screen I/O. It also supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, and all with 99.9% syntax compatibility.

CBASIC is FAST. Not only will CBASIC compiled programs execute 10 to 1000 times faster than Basic, but the time it takes to develop a CBASIC program versus writing a machine language program is much, much shorter. A machine language program that might take several months to write and debug could be created using CBASIC in a matter of days or hours, even for a well experienced machine language programmer. We had a report from a CBASIC user that claimed "a Basic program that used to take 3 hours to run, now runs in 7 to 8 minutes". Another user reported a program that took 1 to 1½ hours to run in Basic, now runs in 5 to 6 minutes!!!

MORE THAN JUST A COMPILER

CBASIC has its own completely integrated Basic Program Editor. The Editor contained in CBASIC is used to Create and/or Edit programs for the compiler. It is a full featured editor with functions designed specifically for writing and editing Basic programs. It has built-in block Move and Copy functions with automatic program renumbering. Complete, easy to use inserting, deleting, extending and overtyping of existing program lines. It is also used for Loading, Saving, Appending (merging), Killing disk files and displaying a Disk Directory. It also has automatic line number generation for use when creating programs or inserting sequencial lines between existing lines. You can set the printer baud rate and direct normal or compiled listings to the printer for hard copy. The built-in editor makes program corrections and changes as easy as "falling off a log". If CBASIC finds an error when compiling, it points to the place in the program line where the error occurred. All you have to do is tell the editor what line you want to start editing and when it is displayed, move the cursor with the arrow keys to the place where the error is and correct it. Just like that, it's simple.

HI-RES & 80 COLUMN DISPLAYS

CBASIC is the only Color Basic Compiler that includes its own Hi-Resolution 51, 64 or 85 by 24 line display. It is also the only compiler that supports both the PBJ "Word-Pak" and the Double Density 80 column cards. All of these display formats are part of the standard CBASIC compiler package. Not only can these display formats be used for normal program editing and compiling, but CBASIC will also include them in your compiled programs! If you want CBASIC to include the display driver in your program, all you have to do is use a single CBASIC command "HIRES". The run-time display driver that CBASIC includes in your program is not just a simple display, but a full-featured display package. With the Hi-Resolution display package you can mix text & graphics, change characters per line, underline, character highlight, erase to end of line or screen, home cursor, home & clear screen, protect screen lines, and much more. All commands are compatible with our HI-RES II Screen Commander so you can easily develop screen layouts using HI-RES and Color Basic before you compile your program. The same applies to using the 80 column card drivers. What other Basic compiler offers you this kind of flexibility?

64K RAM SUPPORT

CBASIC makes full use of the power and flexibility of the 6883 SAM (Synchronous Address Multiplexer) in the Color Computer. It will fully utilize the 96K of address space available in the Color Computer (64K installed) during program Creation, Editing and Compilation. CBASIC has a special command for automatic 64K RAM control. When used in a program, it allows the user to use the upper 32K of RAM space automatically for variables or even program storage at run-time. It will automatically switch the ROMs in and out when needed. There are also two other commands that allow you to control the upper 32K of RAM manually, under program control. No other Color Basic compiler directly supports the use of 64K RAM like CBASIC.

ALL MACHINE LANGUAGE

CBASIC is completely written in fast efficient Machine Language, not Basic, like some other Color Basic compilers. Because of this, CBASIC can edit and compile very large programs. Even using the Hi-Resolution 51 by 24 line display, it can work with about a 34K program, and the 80 column card versions can handle almost 40K of program. Some of the other Basic compilers can only work with 16K or about 200 lines. Even working with large programs, CBASIC compiles programs with lightning fast speed. It will compile a 24K program to disk in less than 2 minutes! That's without a listing being generated. We've heard stories about some other compilers that take almost 10 minutes to compile a simple 2-3K program. You might inquire about this when you look at some of the other compilers available.

THE FINISHED PRODUCT

Since CBASIC contains statements to support ALL of the I/O devices (Disk, Tape, Screen & Printer), Hi-Res Graphics, Sound, and Enhanced Screen displays, it is well suited for a wide range of programming applications. It generates a complete, Ready to Run machine language program. The finished product or program does not have to be interfaced to a Basic program to perform some of its functions or commands. This may seem obvious to you, but some of the other Color Basic compilers don't necessarily work this way. Some of their compiler commands need a separate Basic program in order for them to work. In some cases, require that a separate Basic program be interfaced to the compiled program to perform I/O functions, like INPUT, PRINT and so on. CBASIC doesn't do this. ALL of its commands are compiled into a single machine language program that does not require any kind of Basic program to make it work.

COMPATIBILITY

You may be wondering about those statements we made earlier concerning 99% or 99.9% syntax compatibility. What does that other 1% consist of? The biggest part of that 1% has to do with string arrays and variables. CBASIC does not use a "String Pool" like Color Basic. It uses absolute memory addresses to locate string variables and arrays. This is why CBASIC's string processing is so fast, it also eliminates the time consuming "Garbage Collection" problem. When CBASIC allocates space for strings, it must know how much space to use for each string. When you Dimension a string variable in CBASIC, you must tell it how much space you want to save for each element. To Dimension an array of 40 strings, 64 characters each, you would DIM DA$(40,64). If a string is not dimensioned, CBASIC will automatically allocate 32 bytes for it. If you want a single string to have enough room for 200 characters you would DIM AX$(200). For string arrays, you would still access the element you want, the same as Color Basic, to get string #30 from the array DA$, you would still use DA$(30), the only real change is in the DIM statement. For undeclared string arrays of 10 elements or less, CBASIC will automatically reserve space for 10 (0-9) strings of 32 characters. In some other Color Basic compilers, you have to declare EVERY string variable used in the progrm in a DIM statement. And, to create an array of 40 strings with 64 characters each, you would have to DIM AD$(2560), and then to access string #30, you would have to multiply 30 × 64 and use a special variable name format or access it one character at a time. Not very compatible or convenient to use, and difficult at best.

CBASIC REQUIREMENTS

CBASIC requires a minimum of 32K RAM and at least one Disk drive. We strongly recommend that you have 64K. CBASIC is compatible with all versions of Color & Extended Basic and both Disk Basic V1.0 and V1.1. Programs compiled on either system will run on systems with different ROMs. CBASIC is NOT compatible with JDOS.

DOCUMENTATION

The Documentation provided with any program is very important to the user. This is especially true when you talk about a program as complete and complex as CBASIC. Even though CBASIC was designed to be the most User Friendly compiler on the market, we went to great lengths to provide a manual that is not only easy to use and understand, but comprehensive and complete enough for even the most sophisticated user. The manual included with CBASIC consists of approximately 120 pages of real information, not like some manuals that put just one or two short paragraphs on a page. If we did it that way, we could have easily created a three or four hundred page manual. The manual index breaks down each section of the manual and gives a 3 or 4 word description of each section and its items along with page numbers. The manual has three sections, the Editor, Compiler and Appendix. Each of these is divided into subsections, with Section and Subsection titles printed at the top of each page. If you want to, you could find the information you are looking for by simply flipping through the pages and scanning the Section titles on the top of the pages. The Manual itself is an 8½ by 11 Spiral Bound book with durable leather textured covers. Some of the reports we have had from CBASIC users describe the manual as being the Best program manual they have ever used.

COMPARE THE DIFFERENCE

CBASIC is not just another Color Basic Compiler. It is the only complete Basic Compiler System for the Color Computer. Compare CBASIC's features to what other compilers offer and you'll see the difference. When comparing CBASIC to other compilers, you might want to keep some of these questions in mind. Does it support I/O functions? You can't write much of a program without PRINT, INPUT and so on. What about complex string statements, or string statements at all? How large of a program can you write? Can you compile a complex string like: MID$(RIGHT$(DA$(VAL(IN$),LEN(LE$)),3,3)? Can you use two character variable names for string & numeric variables, like Basic. Does it support all the Hi-Res graphics statements including PLAY, DRAW, GET and PUT, using the same syntax as Basic? Do you ever have to use a separate Basic program? Can you take complete Basic programs and compile them without extensive changes? Will they work? How do you edit a program when it has errors compiling?

PRICE VERSUS PERFORMANCE

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. We spent over 2 years writing and refining CBASIC, to make it the Best, most Compatible Color Basic compiler available. Most of our CBASIC users already bought one or more of the other compilers on the market and have since discarded them. We even traded in a few of them. If you want a cheap compiler, we'll sell you one of those traded in, at a good price. Before you buy a compiler, compare the performance of CBASIC against any Color Basic compiler. Dollar for Dollar, CBASIC gives you more than any other Color Basic compiler available.

ORDERING INFORMATION

To order CBASIC by mail, send check or money order in the amount of $149.00 plus $3.00 for shipping and handling to the address listed below.

To order by VISA, MASTERCARD or COD, call us at: (702) 452-0632 (Monday thru Saturday, 8am to 5pm PST).

CER-COMP
5566 Ricochet Ave.
Las Vegas, NV 89110
(702) 452-0632

DISK
$44.95

NEW

Introducing The "Super Smart"

DATA PACK II

TERMINAL COMMUNICATIONS SOFTWARE

Also Supports The PBJ 80 Column "Word Pak", Deluxe RS-232 Pak, Parallel Printer Card and PBJ 2SP Pak

NEW

TAPE
$34.95

28-64x24 Hi-Resolution Display

64K Support Up To 55K Text Buffer

9 Unlimited Variable Length Macro Key Buffers

BUFFER EDITOR Insert, Delete Change or Add To Buffer

"FEATURES"

- No Lost Information When Using Hi-Resolution Display On Line
- ASCII Compatible File Format
- Full Text Buffering
- Terminal Baud Rates 300 to 9600
- Automatic Word Wrap Eliminates Split Words
- Full/Half Duplex
- Automatic File Capture
- Programmable Word Length, Parity and Stop Bits
- Save and Load Text Buffer and Program Key Buffers to Tape or Disk
- 9 Hi-Resolution Display Formats, 28 to 255 x 24
- True Upper/lower Case Display
- Kill Graphics Option for an Extra 6K
- Supports Line Break
- Freeze Display and Review Information On Line
- Send Files Directly from Buffer or Disk
- Full Disk Support for Disk Version
- Send Control Codes from Keyboard
- Separate Printer Baud Rates 110-9600
- Display on Screen or Output Contents of Buffer to Printer
- Automatic Memory Sense 16-64K
- 9 Programmable Function Key Variable Length Macro Buffer
- Programmable Prompt Character or Delay to Send Next Line
- Programmable Control Character Trapping
- Programmable Open/Close Buffer Characters
- Automatic Key Repeat For Editing
- Program and Memory Status Displays

"The Source"

has arrived!

The Source brings the cost of Disassembler and Assembler Source code generation down to Earth.

Now you can Disassemble Color Computer machine language programs and generate beautiful, Assembler Source Code for a fraction of the cost of other Disassembler/Source Generator programs.

The Source has all the features and functions you are looking for in a Disassembler.

- Automatic label generation.
- Allows specifying FCB, FCC and FDB areas.
- Disassembles programs directly from Disk.
- Supports multiple origin disk files.
- Output complete Disassembled listing with labels to the Printer, Screen or both.
- Generates Assembler compatible source files directly to disk.
- Generated source files are in standard ASCII format that can be edited by most word processors.
- Built in Hex/Ascii dump/display to help locate FCB, FCC and FDB areas in a program.
- Fast Disassembly mode for testing & checking FCB, FCC and FDB mapped areas.
- Built in Disk Directory and Kill file commands.
- Menu display with single key commands for smooth, Easy, almost foolproof operation.

32K Disk $34.95

Starship Falcon

Graphics Adventure Game

Six months ago a terrorist group demanded to be designated the rulers of Alpha Sigma III, under the threat of world starvation on the planet Earth. The Federation denied their demands, so they released a biological weapon which has destroyed all known edible plant species from throughout the known galaxy. To date no plant life has been able to survive on Earth. Recently, Federation undercover agents have reported a story told by a roving space trader, of a planet with abundant edible plant life. These plants have a reputation of being able to survive in all climates and in fact, are supposed to grow at an incredible rate. The Federation is desperate! If Earth's food source is not replaced soon, the Federation will have to evacuate all animal and Human life. Your mission is to go to the planet Zephyr and obtain the seed of these plants and return to Earth. Several Federation agents have been sent to obtain the seeds and none has returned! Can you get the seed and survive??? GOOD LUCK!

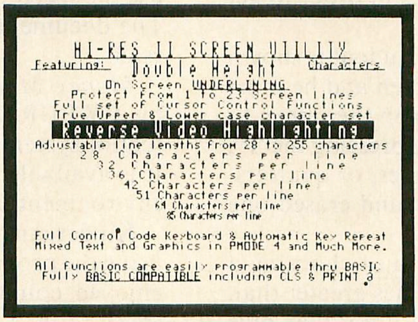
32K Disk $21.95

HI — RES II SCREEN UTILITY

NEW IMPROVED VERSION

- ***UP TO 85 CHARACTERS PER LINE READABILITY***
- ***ADJUSTABLE AUTOMATIC KEY REPEAT***
- ***PROPTECT 1-23 SCREEN LINES***
- ***CONTROL CODE KEYBOARD***

- FULLY BASIC COMPATIBLE
- DISPLAY FORMATS OF 28 to 255 CHARACTERS PER LINE
- FULL 96 UPPER/LOWER CASE CHARACTERS
- MIXED GRAPHICS & TEXT OR SEPARATE GRAPHIC & TEXT SCREENS
- INDIVIDUAL CHARACTER HIGHLIGHTING
- REVERSE CHARACTER HIGHLIGHT MODE
- WRITTEN IN FAST MACHINE LANGUAGE
- AUTOMATIC RELOCATES TO TOP OF 16/32K
- AUTOMATICALLY SUPPORTS 64K of RAM WITH RESET CONTROL
- REVERSE SCREEN
- ON SCREEN UNDERLINE
- DOUBLE SIZE CHARACTERS
- ERASE TO END OF LINE
- ERASE TO END OF SCREEN
- HOME CURSOR
- BELL TONE CHARACTER
- HOME CURSOR & CLEAR SCREEN
- REQUIRES ONLY 2K OF RAM
- COMPATIBLE WITH ALL TAPE & DISK SYSTEMS



```
HI-RES II SCREEN UTILITY
Featuring:  Double Height  Characters
On Screen UNDERLINING
Protect from 1 to 23 Screen lines
Full set of Cursor Control Functions
True Upper & Lower case character set
Reverse Video Highlighting
Adjustable line lengths from 28 to 255 characters
28 Characters per line
32 Characters per line
36 Characters per line
42 Characters per line
51 Characters per line
64 Characters per line
85 Characters per line

Full Control Code Keyboard & Automatic Key Repeat
Mixed Text and Graphics in PMODE 4 and Much More.

All Functions are easily programmable thru BASIC
Fully BASIC COMPATIBLE including CLS & PRINT @
```

$24.95 TAPE **$29.95** DISK

ALL ORDERS SHIPPED FROM STOCK
ADD $2.50 POSTAGE

Circle Reader Service card #335

CER COMP

5566 Ricochet Avenue Las Vegas, Nevada 89110

(702) 452-0632

Screen Enhancement Program Comparison Chart

PROGRAM FEATURES	HI-RES II NEW	HI-RES I OLD	BRAND X
Upper/Lower case characters	Yes	Yes	Yes
Mixed Text and Graphics	Yes	Yes	Yes
Separate Text & Graphics	Yes	Yes	No
Print @ fully implemented	Yes	Yes	Yes
Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	28 to 255 (9)	28 to 255 (9)	51 only (1)
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Disable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Solid or Blinking Cursor	Yes	No	Yes
CLS command supported	Buff/Biack	Buff/Black	Buff/Black
X.Y Coordinate Cursor Positioning	Yes	Yes	No
Double Size Characters	Yes	Yes	No
Individual/Continuous Highlighting	Yes	Yes	No
On Screen Underlining	Yes	Yes	No
Clear Key functional	Clear/L keys	Clear key	No
16.32 & 64K Supported	Yes	Yes	Yes
Green or Black Background Color	Yes	No	No
Dual Character sets for Enhanced 64 and 85 Characters per line display	Yes	No	No
Protected Screen Lines (programmable)	1 to 23	No	No
Full Control Code Keyboard for Screen control directly from the keyboard	Yes	No	No
Programmable Tab Character Spacing	Yes	No	No
Full Screen Reverse Function	Yes	Yes	No
Switch to & from the Standard 16 by 32 Screen for full compatability	Yes	No	No
On Error Goto Function	No	No	Yes
Extended Basic Required	No	Yes	Yes
All Machine Language Program	Yes	Yes	Yes
RAM Required in addition to Screen RAM	2K	2K	2K
Program Price (Tape)	$24.95	$19.95	$29.95

VISA. MASTERCARD AND C.O.D. ACCEPTED

Money Math Teaches Children Coin Values

If you have a young child who is excited about using money but confused about its values, *Money Math* may be a useful addition to your home or school library. *Money Math* is an educational program targeted for first- through third-grade children (and useful for remedial tutoring for upper grades). It uses high resolution graphics and a voice synthesizer (optional) to teach children the value of common U.S. coins and the dollar, how to count various combinations of coins and even how to spell them.

Money Math comes in two versions, a 32K program and a 64K version. The programs are identical except the 64K program offers voice prompts, help and encouragement by utilizing The Voice speech synthesizer from Speech Systems.

After the initial Hi-Res title page, which includes a display of the coins and dollar, the program displays a menu of 15 options comprising six categories. The categories are: Coin Values, Spelling, Count to $1.00 with . . ., Count Coins, Mixed Coins and Choose Coins.

Selection from the menu is highlighted and made through movement of the up or down arrows and ENTER key. Large graphics coins are used throughout all options. (The quarter is one and one-half inches on a 13-inch screen; the rest of the coins are proportionally presented and easy to read.)

The first category, Coin Values, randomly shows the child the four basic coins (penny, nickel, dime, quarter) and the dollar along with the name of the currency. The child has to enter the value of the currency in either decimal or cents notation. The second category reinforces the correct spelling of the appropriate coins and dollar.

The next three sections (10 options) drill the child in counting coins, and offer the choice of counting to one dollar using a particular coin or of counting a variety of groups of coins. The easier counting categories require input in cents notation. The most difficult category, Mixed Coins, requires decimal notation when working with sums greater than one dollar. (The child is required to place the dollar sign and decimal point in the correct places in order to get credit for the problem.)

In the final category, Choose Coins, the student is shown a monetary value on the bottom of the screen and he must place an appropriate combination of coins on the screen to equal that value. This is accomplished by depressing the 'P', 'N', 'D' or 'Q' keys for pennies, nickels, dimes, or quarters. The selection of coins can be in any order and erased one coin at a time if desired.

Choosing Coins does not have the option of choosing a dollar bill, even if you are working with values greater than one dollar. My third-grade son wanted to use dollar bills and I thought about that idea myself. It might be a possible addition to the program. However, I can see many disadvantages to that approach. For example, dollars and dimes both begin with 'D', dollars take up considerably more space on the screen, and counting money problems become much more simplified and too easy to solve if dollars are used instead of coins to produce a dollar's worth of currency on the screen. Perhaps it might be best to leave this routine as is.

There are several additional features that should be noted. The 'C' key is used to change the color of the penny to its copper color if it should be blue initially.

Normally, the child makes a selection from the menu and is drilled through a total of 10 problems before he is given a random musical and graphics reward and returned to the menu. The child may quit, however, at any time by pressing the CLEAR key, and return to the menu. Needless to say, there is no reward in such an action. The rewards are brief and entertaining, and have a positive influence on the kids. If using the 64K talking version, the child is also rewarded with verbal phrases like "congratulations," "super," "outstanding" and a surprising "supercalifragilisticexpialidocious."

The student can receive help at any time by pressing the space bar. Help is available in all levels at any time and always shows the child the correct answer or one of the possible solutions. Additionally, in the Mixed Coins category, the computer provides a step-by-step counting of each coin, accumulating the sum of each value at the bottom of the screen and highlighting the coins counted as each is added. The 64K version provides a verbal counting of the coins in addition to the visual presentation.

The right arrow is used to erase answers throughout all drills. It seems more natural for children who have used the CoCo to associate the left arrow with erasing. Perhaps it would be desirable to leave the right arrow in the program, but add one line of code to accept the left arrow erase as well.

I had a problem with trying to run the 64K program. My computer has always been able to handle the speedup poke (`POKE 65495,0`), until now. For some reason the placement of the poke within the program caused peculiar screen problems. After several attempts at various solutions, I took a close look at the software and discovered that removal of the speedup poke solved the problem. Therefore, if *Money Math* seems to load OK, but you have unusual effects or problems running the program, try replacing the `POKE 65495,0` with `POKE 65494,0` in lines 13 and 1000. You'll have to load the program *MONEYT* by itself, without following the normal instructions for loading, in order to edit that program. The author has been notified of the situation and a note probably will be added to the documentation. If you know that your computer can not use the speedup poke, be sure to mention it with your order. The documentation, by the way, is quite clear and easy to read.

Money Math, along with several educational programs by CY-BURNET-ICS, is tested and used in elementary school systems in Tennessee and is quite student friendly. It is available for Network use as well as individual family environment use.

Kindergartners seemed to need more help, but enjoyed using the program. Older, early-elementary kids loved it and enjoyed counting and manipulating money on the TV. I think *Money Math* shed a new light on some of the things they had been working with on paper at school. I highly recommend *Money Math*.

(CY-BURNET-ICS, 5705 Chesswood Dr., Knoxville, TN 37912, 32K ECB, cassette $29.95, disk $32.95)

— Kenneth D. Peters

Options Galore with *CGP-220 Screen Dump Package*

The *CGP-220 Screen Dump Package* consists of six separate programs. Basically, they accomplish two things. Three of the programs create four-color pictures while the other three produce monochrome results. The package includes versions that run on 16K and 32K Color Computers. Two of the programs allow the user to print the two-screen images produced by *CoCo Max*. Memory limitations, however, require the user to be using at least a 32K machine.

The package is well-written and organized. Pretty menus were sacrificed for ease of use and efficiency of programming. The programs are easily transferred to disk for those who have disk drives.

Several printing options are provided in this package. When printing color images, the user can alter the printed colors as related to those shown on the screen. One can also select normal or double-sized images. When printing mono images, the options include printing in any of eight colors and the ability to print the negative of the image. These capabilities allow the creation of attractive, as well as weird, results. Imagine . . . purple people and blue pets.

Although the documentation explains all options, one thing needs to be clarified. The user is asked to `CLEAR` some memory before loading one of the programs. My gripe with this is that it doesn't tell the user how much memory to clear. Because of my past experience I was able to allow enough memory. However, a new CoCo user might not be so lucky. Also, the loading instructions should be organized in an itemized "step" fashion. These changes would be relatively simple.

All in all, *CGP-220 Screen Dump Package* is an excellent buy for $14.95. Aside from those problems in the documentation, it surpasses products you might find elsewhere.

(CMD Micro Computer Services, Ltd., 10447 124th Street, Edmonton, Alberta, Canada T5N 1R7. Distributed in the U.S. by Saguaro Software, P.O. Box 1864, Telluride, CO 81435, cassette $14.95 plus $2 S/H)

— Cray Augsburg

Hall of the King Challenges Avid Adventurers

If you like Adventure games, and enjoy programs that show how far Color Computer programming has advanced in recent years, you should experience *Hall of the King* to see how good it gets.

Available from Prickly-Pear Software, *Hall of the King* is one of the best Adventure programs I have experienced to date. I wish I could report my victory but thus far I have been unable to solve the game. *Hall of the King* is a challenge for even the most avid Adventure player.

The opening credits are impressive and make you feel as though you're watching a show on television because the special effects are special. Next, you receive an in-depth background on the situation you're becoming involved in. You can review the scenario a page at a time at your own speed. The authors have taken time to research the topic while remaining imaginative so you're primed when the Adventure begins.

Hall of the King consists of two disks, and gives you a lot more playing time that you might need when an Adventure is so complex and challenging. Although there are two disks, only one disk drive is required, but you need to have 64K.

The graphics are many and well-done. *Hall of the King* is 100 percent high resolution graphics in detailed color. I enjoyed wandering through the *Hall of the King* admiring the programmer who spent so much time polishing all the fine details.

The response time to commands is almost immediate, except for a brief wait between commands while new graphics are drawn, which I didn't mind at all. There are `SAVE` and `LOAD` commands that make it possible for you to resume where you left off between games with ease. The packaging of the program is a vinyl container making it handy to grab and load. The documentation is thorough and well-done.

Good Adventures like *Hall of the King* keep the Color Computer's future bright.

(Prickly-Pear Software, 2640 N. Conestoga Avenue, Tucson, AZ, 85749, two disks $39.95 plus $1.50 S/H)

— Barbara Combes

S•S•S *OUTLINER*

SNAP STUDY SYSTEM is quick and simple. There are no forms to design or set up. Just start entering records as in a book. At any time, use the arrow keys to browse through chapter headings, pages, items. It's easy to add, revise, delete, print.

A unique and cozy filing system is used. There are NO FILE NAMES to remember ! ! !

RECORD reference notes for books, talks, guides, checklists, requirements, things to remember, note, review.

PLAN an outline or summary for reports, manuscripts, agendas, duties, any ideas or projects to be done.

```
JOBS FILE PARTIAL PRINTOUT
--------------------------
HOME
  HOUSE MAINTENANCE
    Change kitchen washers
    Paint utility room
    Replace light bulbs
    Check smoke alarm ****
    Car service MON 9AM
  YARD
    Prune hedge, shrubs
    Gate hinges - fix
    Clean out eave troughs
    Marigolds-seed MAR 1st
ENGINEERING
  PROJECT '200
    Preliminary plan
    etc. . . .
```

3 sample files are included (see left)

32K DISK
$19.95 U.S. $25 CAN
(+$2 Shipping)

COZY SOFTWARE
25142 53 Ave
Aldergrove
British Columbia
CANADA V0X1A0

Advanced Utilities — Five OS-9 Goodies

I was once asked, "What do you buy for the computer when you already have a word processor, a spreadsheet and a database?" I told the questioner to buy utilities. Utilities are those wonderful little programs that exist only to make the computer do more for us in an easier way. To this end, Computerware has released a set of five OS-9 utilities packaged together as *Advanced Utilites.*

The five utilities included in the package are *Kshell*, a direct, more powerful replacement for Shell; *Cpy*, a more powerful version of Copy; *Archive*, a backup utility to back up hard disks to floppies; *Flink*, a program to define what file to use as the boot file on the next reboot; and *Unload*, used to remove a program from memory by recursively unlinking it. The five utilities come on one disk, which is unprotected. Also included is a nine-page manual that explains the utilities and has examples for each. The explanation for *Kshell* is wonderful and covers all aspects of this utility. The other utilities seem to suffer a little, though.

Kshell is the showpiece of the package. This program takes the place of the shell to give a more powerful command interpreter. Its most powerful feature is its automatic wild card extensions. Any place on an OS-9 command line you would place a filename, you can use a wild card. Use it to match any file in the directory that corresponds to a pattern. The '*' character matches any set of zero or more characters. The '?' character matches any single character. For example, the command "del *.bas" deletes all files in the current directory that end with ".bas." The command "del file?.txt" deletes files such as "file1.txt," "file2.txt," "filez.txt" and any other file that fits the pattern. This works with all OS-9 commands that let you give a list of filenames on the command line. It does not work on OS-9 commands that only use the first filename found on the command line. For example, the ident command only reports the first file no matter how many are stated. Thus, a wild card used with ident still only gives one report.

Another feature of *Kshell* is its PATH variable. You may assign a value to PATH to tell OS-9 where to look for commands. The command PATH="/d0/cmds:/ho/cmds" tells OS-9 to look for a command first in /d0/cmds and then in /h0/cmds. You can give it as many paths to search as wanted. Although not stated in the manual, I am sure there is some limit on the number of characters the PATH can have.

In addition to the PATH variable, *Kshell* gives four user-defined variables or macros. These are called $1 through $4. You may give them any value and substitute them anywhere in an OS-9 command line. If you set $1 equal to /d1/docs/reviews/advutil.txt, all you have to do to edit that file is enter edit $1. In addition to saving repetitive typing, macros can be passed to procedure files. The command `proc $2="program"` sets $2 to the string "program" for the duration of the procedure `proc`. In the procedure file you would use $2 in any place you would normally use a filename.

Kshell has also borrowed some ideas from the UNIX operating system. One of these is the use of the single opening quotation mark (') character. If a command is placed within single opening quotes, its first line of output is substituted at that point. For example the command echo Current directory is 'pwd' generates this: Current directory is /d1/docs/reviews. You can mix this with the macros. $1='pxd' sets $1 equal to the current execution directory.

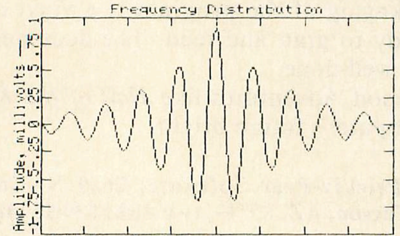
GRAFPLOT

NEW! IMPROVED! SAME LOW PRICE!

DEMONSTRATION
VERSION AVAILABLE
SEPARATELY
FOR $5.00 -
REFUNDABLE WITH
PURCHASE (ADD
$3.00 SHIPPING)

UNCONDITIONAL
MONEY-BACK
GUARANTEE!!

RAINBOW
CERTIFICATION
SEAL



- ✱ OVER 100 GRAPHING SYMBOLS AND UNLIMITED OVERLAY OF DATA.
- ✱ TWO INDEPENDENT VERTICAL AXES WITH SEPARATE SCALES.
- ✱ AUTOMATICALLY SCALES AND LABELS ALL THREE OF THE AXES.
- ✱ CALCULATES MATH FUNCTIONS, INTEGRALS AND MOVING AVERAGES.
- ✱ EASY TO USE, MENU-DRIVEN OPERATION WITH 37 PAGE MANUAL.
- ✱ WORKS WITH ALL CoCo MODELS - REQUIRES EXTENDED BASIC.

16K TAPE - $35.00, 32K TAPE - $40.00, 32K DISK - $45.00 (US)

NEW!! PRINTER *Picture Perfect* NEW!! UTILITY
UNIVERSAL SCREENPRINT PROGRAM

- ✱ GET "PICTURE PERFECT" FULL-PAGE PRINTOUTS EVERY TIME!
- ✱ "PERFECTLY SIMPLE" TO OPERATE - "SIMPLY PERFECT" RESULTS!
- ✱ "PERFECTLY COMPATIBLE" WITH ALL DOT MATRIX PRINTERS!
- ✱ GET "PERFECT CONTROL" OF: HEIGHT, WIDTH, POSITION, BAUD RATE, DOT DENSITY, NEGATIVE IMAGES, ETC.
- ✱ THE "PERFECT SOLUTION" TO YOUR GRAPHICS PRINTING NEEDS!

◆ ONLY $25.00 ON DISK OR TAPE ◆

CALL NOW FOR FREE INFORMATION (415) 547-7557, OR WRITE:
HAWKES RESEARCH SERVICES, 859 STANFORD AVE, OAKLAND, CA 94608
YOUR PERSONAL CHECK IS WELCOME! SHIPMENT WITHIN 48 HOURS!
ADD $3.00 SHIPPING ON ALL ORDERS. CA. RESIDENTS ADD SALES TAX

Hint . . .

Goin' Steady On BBS

Here is a short program to demonstrate how someone may get their messages to print evenly on a BBS.

```
1 REM RICHARD BECK
2 REM KISSIMMEE,FL
10 CLS:CLEAR 1000
20 LINEINPUTA$:CLS
30 GOSUB50
40 IFINKEY$=“”THEN40ELSE20
50 FORP=1TOLEN(A$):PRINTMID$(A$,P,1);
60 X=X+1:IFX>26ANDMID$(A$,P,1)=“”THEN
PRINT:X=0
70 IF X=30 THENPRINT“-”:X=0
80 NEXT:X=0:PRINT:RETURN
```

Richard Beck, IV
Kissimmee, FL

Also from UNIX, *Kshell* accepts either the standard CHD and CHX commands or the aliases of CD and CX. Comment lines under *Kshell* may begin with either an '*' as in the normal shell or with an '#' as in UNIX.

The *Kshell* has a few other features. The command prompt can be set to whatever is wanted. The command -"p="Ksh>" would replace the OS9: prompt with Ksh>. Error reporting can be turned on or off. The command "-e" turns on full error messages like PRINTERR does. The difference is that a -ne command turns off error reporting. You can also specify what file to take the error messages from if you want to use something other than the system default. *Kshell* has improved upon the standard shell's redirection capability. The output of a command may be redirected to a file, to append to an existing file, or to overwrite an existing file.

To get all these extra features, you must give up something; what you give up is memory. *Kshell* reduces available memory by about 3.5K. This may be a problem if memory is tight. Using *Kshell* and a Hi-Res screen utility only left enough room for me to edit an 8K document with my word processor, as opposed to a 12K document under the standard shell. Those using the standard 32 by 16 screen or an 80-column hardware card may not miss that 4K as much.

If it seems that the other four commands are getting the short end of the stick here, you're right. They also get shortchanged in the manual. While *Kshell* is covered in full detail with several examples for each command, the rest of the utilities are covered in less detail.

The *Cpy* utility is an improvement upon the Copy command. In addition to the standard Copy features, it can copy multiple files to a directory. Used with *Kshell*'s wild cards it can be very useful. The command "Cpy /d1/source *.bas" copies all BASIC programs in the current directory to /d1/source. *Cpy* is a little confusing though. To copy one file to another, the syntax is "Cpy source destination," while to copy multiple files it is "Cpy Destdir source1 source2 source3 . . . ." I have no idea why the author used two separate syntaxes on the same program.

The *Archive* utility is used to back up hard disks or large floppies to smaller media. It allows copying these large media to several smaller ones without splitting files over two different smaller medias. This command worked exactly as the documentation said it would and without any problems.

The *Unload* utility is a recursive version of Unlink. *Unload* removes a module from memory by repetitively unlinking it until it disappears from memory. This also worked as described.

The final utility, *Flink*, is an interesting one. It allows you to state what file the system is to boot from on the next reboot. Thus, you could have two or more boot configurations on a disk and choose which to use. This also seemed to work just as it is described.

What you get with *Advanced Utilities* is a very good replacement shell and four good utilties. The *Kshell* itself is worth the price. All five utilities were tested under both OS-9 Version 1.01 and Version 2.0 without any problems.

(Computerware, 4403 Manchester Ave., Suite 102, Box 668, Encinitas, CA 92024, $29.95, requires OS-9 operating system)

— Mark Sunderlin

Software Review

Vegas Game Pak — CoCo Goes Casinoing

If you're having the gang over for a party soon, you'll be doing them and yourself a favor if you have the *Vegas Game Pak* on hand. It has six games, count 'em, and if your friends enjoy gambling, this is the next best thing to being in Nevada.

The selections include: Poker — Everybody's favorite card game, complete with graphics face cards and the ability to enter as high a credit line as you choose before the game gets under way. You may bet as much as five dollars per hand; Keno — The screen displays a series of 80 numbers. The challenge is to pick the 10 numbers you believe the computer will select. Your numbers are indicated by a blue checkmark until replaced by red checkmarks — should the computer choose one of your numbers. The game includes the capability of changing numbers if you want to change your selection before the action begins; Blackjack — Nice graphics cards with some handy options, including splits, doubles and insurance that allow you to increase your earnings fairly quickly, if you're lucky; Three different slot machine games, including Riteleft, Bar5 and 3Line. These are variations on the theme of spinning wheels, fruits and numbers.

All six games are written in machine language and are very responsive to user input. Betting is easy, the action is smooth, running totals of earnings are available and suspense is ever present.

Vegas Game Pak is fun. It is a good bargain because almost every one of these games would be a nice draw if sold separately.

(NovaSoft, 4285 Bradford N.E., Grand Rapids, MI 49506, tape $29.95, disk $27.95 plus $2 S/H)

— Barbara Combes

Hint . . .

Color Computer 2 Warning

If you are upgrading your new CoCo 2 to 64K, remember that the 16K chips you are taking out are *not* the same as the 16K chips (type 4116) that earlier CoCos used. They are type 2118, which use a different power supply (+5 volts only) and *will not* work in earlier units, and could cause damage. (If you intend to do a 32K "piggyback" expansion on your CoCo 2, use another set of 2118s, *not* 4116s that came out of an older computer.)

NumberJack — An Auxiliary Keyboard Input Device

HJL has now provided the Color Computer with the long-missing Numeric Key Pad Area by introducing a device it calls NumberJack.

Initial reaction by many of you will be, "I have number keys already; what do I need another gadget for?" Well, I felt that way too, but my preference for HJL products (I own several) led me to try NumberJack. I do enough calculation and spreadsheet work to make reasonable use of the device. The question in my mind was whether spreadsheet use of it alone could justify its hefty price.

I am now convinced that NumberJack justifies its cost not just as a spreadsheet convenience, but as an auxiliary input device in the fullest sense of the word.

The unit is approximately six or seven inches on a side, and a few inches thick. The numeric keypad is attached to the computer by a length of ribbon cable that projects about two feet from the underside of the computer case on whichever side you choose. On the top are 24 keys, including the 10 digit keys (zero through nine), four arrow keys, four primary math operations (add, subtract, multiply and divide), two relational operators (< and >), and four computer control keys (@, CLEAR, SHIFT and ENTER).

A competent technician could install NumberJack in under three minutes, but the average owner may take closer to 15 minutes. The installation involves opening the case, removing the keyboard, and then connecting both the keyboard and the numeric key pad to a small T-shaped adapter board. This is then replugged into the keyboard connection receptacle. (The specimen I received included T-connectors for all versions of the CoCo; the shipping documents imply that you might receive only the adapter appropriate to your model.) In no case is soldering needed. For some CoCo 2 installations, an additional grounding pigtail is needed and supplied, and the method of attaching that is simple and well-planned. The computer case must be cut to let the ribbon cable out, and the ribbon cable must be attached to a ventilation slot to provide strain-relief on the cable. The other end of the ribbon cable is then plugged into a receptacle on NumberJack.

The directions warn that erroneous characters on the screen mean the cable is plugged in backwards. The best solution for that is to reopen the case and turn the ribbon the other way in the T-connector. Expecting that the average user may be reluctant to open his case, HJL advocates simply turning the cable over and plugging it into the NumberJack the other way. That will work also, but gives a less professional appearance.

Here I must fault HJL for a few minor shortcomings. The instructions do not mention that other sources of erroneous characters are stuck keys! I spent two hours trying to get the unit to work properly before I discovered that a small burr of plastic where the ENTER key rubbed on the edge of the cover was causing such anomalies as double characters when SHIFT-8 (the open parenthesis) was pushed, inoperative ENTER from the keypad but correct operation of ENTER from the main keyboard, and similar problems. I called HJL about the problem. They said mine was the only case of this problem so far reported and had me return the unit for warranty re-work. I shipped it to them, and received a fully repaired unit in exactly eight days.

I can attest to the fact that customer support has been excellent; my own experience has been that questions normally receive return phone calls with adequate answers in under four hours. This is the first time I have had to return hardware to HJL, and a check with two local CoCo Clubs and a few local dealers indicated that hardware returns are rare for HJL, and that their service is consistent with the excellent phone support I experienced.

However, I feel strongly that the receptacle on the side of NumberJack and the connector inside the computer should both have been made idiot-proof, rather than simply suggesting reversing the plug in the receptacle. I say this because an upside-down plug on the unit looks bad, and I could very easily connect the cable to the unit with pins misaligned.

Once my unit was working, I tried some calculations and spreadsheets. Naturally, the unit worked as advertised, and I found the "phone dial" approach to number crunching significantly less tiring than the use of my normal keyboard. But then my kids interrupted. I have a three-year-old who is into Sesame Street educational software. I never realized how intimidated she had felt by the large keyboard when doing her simple preschool math. She grabbed NumberJack and wouldn't give it (or my CoCo) back! Her comprehension and speed rose dramatically, and I concluded that the more convenient arrangement of number keys can make a big difference in educational uses.

Next, my nine-year-old took over the CoCo to play a video game. He prefers to play *Frogger* with arrow keys rather than joysticks. Again, NumberJack was preferred to the normal keyboard input. Then, I tried modeming, and found that having a spare CTRL (alias CLEAR) key, or another ALT (alias '@') key was something to be appreciated.

My CoCo is stationed in the den, with a monochrome monitor facing one wall. The family TV is on another wall and serves as our color display. I often get backaches twisting to watch both displays when using software with color capability. Since 80 percent of my usage is word processing, I cannot justify replacing the monochrome monitor with a color one. Suddenly my swivel chair and the two feet of ribbon cable became the solution to the problem. A number of my programs were readily modified to accept punctuation or number responses in place of, and in addition to, the use of single letter responses to some prompts. Thus, I could turn in the chair with NumberJack on my lap and comfortably view the color display while retaining full control of the computer.

NumberJack is not just a spreadsheet convenience, but rather a true auxiliary keyboard input device. It may soon be viewed not as a luxury, but as a normal upgrade for the CoCo.

(HJL Products, a division of Touchstone Technology, Inc., 955 Buffalo Road, P.O. Box 24954, Rochester, NY 14624, $89.95)

— H. Larry Elman

Become a King in *Wizard's Tower*

Before he died, the Wizard King hid three magic talismen in the dungeon under his tower and protected them with monsters. Your quest is to find the three talismen and become king.

There is nothing I like better than a great Adventure game, but this is not really an Adventure game so much as it is a Dungeons and Dragons simulation.

Play takes place on three Lo-Res text graphics screens. The first screen shows the countryside with various terrain and monsters. After buying supplies in town (food, magic spells, weapons, armor), make your way across the screen to the tower. Upon entering, go to the Dungeon screen. It shows the corridors, treasure chests and evil creatures of the dungeon. The idea is to steal treasure chests while killing or avoiding the evil creatures. A treasure chest may contain gold or may have one of the magic talismen. The third screen is a smaller, simpler version of the second screen.

When you find the three talismen and return them to the village, you win. Before achieving that goal, however, you will have to return to the village for more food rations or better armor and weapons.

Unfortunately, the creatures (goblins, wizards, dragons, balrogs) are less than intelligent. Represented by text letters, they wander around on the screen. No matter how many you kill there are always the same number of them on the screen. Everytime you move, all of the creatures make a move.

The game is easy to learn and takes about a half hour to play. The graphics are not high resolution and the action can be slow and repetitive. The program is written in BASIC. If you enjoy programming you might like to modify it to correct for the slowness.

This game is a good choice for the price.

(Mitchell Software, P.O. Box 194, Tomahawk, WI 54487, $9.95)

— James Ventling

Telewriter-64 Character Set Editor Makes Modifications Easy

One of my most frequently used and favorite programs is *Telewriter-64*. This latest offering from CMD Micro makes this popular word processing program even more appealing.

The *Telewriter-64 Character Set Editor* provides an easy way to modify the character set used by *Telewriter-64*. Three new fonts are included with the program that demonstrate the capability of the software. "Descend" provides real honest-to-goodness descenders on the screen and "French" adds French characters to the vocabulary.

Modification of characters is simple. With the aid of cross hairs, arrow keys, and an eight-times larger-than-normal character, you can edit any character and make it look as you want it to. While you see real descenders, you will not be able to print them unless your printer has true descenders as well. You can modify characters to your heart's content, and the printout is not affected. However, if you have a printer that allows downloading character sets, you could use this program to create unique characters.

The program is menu driven and easy to use. The documentation is adequate, consisting of six pages of detailed instructions on the program's application and use. All modified fonts can be saved to tape or disk. The software is supplied on tape but can easily be transferred to disk. It works on all versions of *Telewriter-64* and is not copy protected, so backup copies can be made. I liked this program. It did what it is was advertised to do and won't leave an empty spot in your wallet.

(CMD Micro, Computer Services Ltd., 10447 124 St., Edmonton, Alberta, Canada T5N 1R7. Distributed in the U.S. by Saguaro Software, P.O. Box 1864, Telluride, CO 81435, cassette $14.95, plus $2 S/H)

— Jerry Semones

ASSEMBLY LANGUAGE PROGRAMMING for the TRS-80 COLOR COMPUTER

At last - The book exclusively for you and your CoCo !! You've learned BASIC and are now ready to learn assembly language programming. This hands-on guide begins with the basics and progresses to the expert level; revealing programming conventions and techniques and all the internal capabilities of the TDP-100, CoCo 1 and 2. At every step of the way are illustrations, sample programs, and plain English explanations. All sample programs are shown as assembled with Radio Shack's EDTASM+ cartridge. Plus, a complete chapter explains how to use all EDTASM+ capabilities. This book describes how to write subroutines, interrupt handlers, programs that control the graphics display modes, cassette, disk, keyboard, sound, joysticks, serial I/O, interrupts, and use of ROM resident subroutines. Not only is the MC6809E microprocessor described, but also the video display generator (VDG), peripheral interface adapters (PIA), and how they all work together. This book is suitable as a high school or college textbook.

CHAPTERS: The Binary Number System - Memory and Data Representation - Introduction to MC6809E Microprocessor - Addressing Modes of the MC6809E - MC6809E Instruction Set - Assembly Language Programming with EDTASM+ - Assembly Language Programming - Assembly Language and Extended Color BASIC - Internal Control and Graphics - Technical Details.

289 pages
soft cover

TRS-80 & EDTASM+ are
trademarks of Tandy Corp

$16.00 U.S. plus $1.50 shipping. Check or money order. RI residents please add 6% sales tax. Volume discounts are available.

Published and
sold by

TEPCO
30 Water Street
Portsmouth, RI 02871

Modest Packaging Can't Hide *SCRDMP10*'s Usefulness

Let's get the negative thing out at the beginning. *SCRDMP10* comes modestly packaged on an average quality commercial cassette. The documentation accompanying the cassette is two paragraphs that very briefly describes what the program does and how to get it up and running.

But don't be discouraged and don't be fooled. Once it's fired up, you discover that behind those humble trappings is one slick screen dump program that reproduces a `PMODE 3` or `4` screen through a DMP printer with a minimum of fuss and bother.

SCRDMP10 comes on a cassette in the form of a BASIC driver. When the program is run, you are provided with a pair of prompts. The first is for your printer's graphics control codes (ENTER defaults to those of the DMP-100, which worked fine with my DMP-110). The second prompt asks for a loading address, and here you may run into a snag, since the documentation is neither clear nor helpful (hint: Begin the routine from a cold start — `POKE 113,0:EXEC40999`, and if you have a DMP-100 or one of its cousins, try entering 14848). The actual ML program is poked in and you are given the choice of saving it to tape or disk.

Now you're home free. After loading or drawing the graphics screen, simply enter `EXEC`. You are prompted for the choice of background color (to reverse the printout) and the Baud rate for the printer. Position the paper at the top of the head, push ENTER, and away you go! It's as easy as that.

As soon as the print is finished, you are offered the choice of rerunning (again with the option of reversing the colors) or returning to BASIC to draw or enter another graphics screen and repeat the cycle.

The finished format is six and a half by seven inches sideways, and, as might be expected, there is a degree of distortion in the printout, relative to what is on the screen. I also discovered that I could not copy the ML program between drives. So, unless you are luckier than I, you'll have to use the Backup routine and then copy whatever else you might want on the disk with it. I'm not into drawing with my CoCo, but I did try the program as a tool for printing out graphs generated by Tom Mix's *Teachers Data Base* and billboards of some other pieces of software in my library. I had no problems at all.

The main problem with this software is its poor documentation. If you can get by that and the modest packaging, you have a quick and easy, black-and-white screen dump.

(Neat-O Software, Rt. #3, Box 205, Kingsport, TN 27664, cassette $10 plus $2 S/H)

— John Ogasapian

PERRY COMPUTERS

COLOR COMPUTERS	LIST PRICE	OUR PRICE
26-3136 16K Standard Color Computer 2 ..	$119.95	$ 99.00
26-3127 64K Extended Color Computer 2 .	199.95	169.00
26-3131 Disk Drive 0 for Color Computer ..	299.95	240.00
26-3130 Disk Drive 1 for Drive 0	199.95	169.00
26-3008 Joystick	19.95	16.95
26-3012 Deluxe Joystick (EACH)	29.95	25.00
26-3018 Extended Basic Kit	39.95	36.00
26-1208 CCR-81 Tape Recorder	59.95	50.00
26-1173 DCM-3 Direct Connect Modem ...	59.95	50.00

SOFTWARE		
30001210 Telewriter 64 Tape	$ 49.95	$ 42.00
30001220 Telewriter 64 Disk	59.95	49.00
30001110 VIP Writer	69.95	59.00
30001140 VIP Database	59.95	49.00
30001150 VIP Terminal Disk	49.95	45.00
30001170 VIP Integrated Software	149.95	139.00
30001130 SS/DD 10 Pack Diskettes	21.00	14.00

PRINTERS AND ACCESSORIES		
26-1276 DMP-105 80 cps Dot Matrix	$199.95	$169.00
26-1280 DMP-130 Dot Matrix	349.95	285.00
20001025 EPSON LX-80 Printer	369.95	225.00
20001515 EPSON LX-80 Tractor Feed	29.95	25.00
20021070 OKIDATA 182 Printer	299.00	245.00
20041020 STAR SG-10 Printer	299.00	250.00
30009110 BOTEK Serial to Parallel Interface		59.00

TANDY COMPUTERS	LIST PRICE	OUR PRICE
26-1070 Model 4D Desktop 64K 2 FD & Deskmate	$1199.00	$ 895.00
25-1000 Model 1000 1 FD 128K & Deskmate	999.00	705.00
25-1001 Model 1000 1 FD & 10 Meg HD 256K	1999.00	1475.00
25-3000 Model 1200 1 FD & 10 Meg HD 256K	2499.00	1525.00
25-3001 Model 1200 Two FD 256K	1499.00	1200.00
25-4000 Model 3000 One FD 512K	2599.00	1900.00
25-4010 Model 3000 1 FD & 20 Meg HD 512K	3599.00	2600.00
26-3901 Model 600 Port Comp 32K 1 3½ Disk	1599.00	1195.00
25-1021 CM4 Color Monitor	299.95	225.00
25-1022 CM10 Color Monitor	459.95	380.00
25-3010 VM-3 Monochrome Monitor	219.00	185.00
26-5111 VM-1 Monochrome Monitor	199.95	165.00
26-5112 CM-1 Color Monitor	599.00	510.00
25-3043 Graphics Adaptor T-1200, T-3000 .	299.00	185.00
25-3047 Deluxe Graphics Adapt T-1200, T-3000	499.95	395.00
25-3130 MS-DOS 2.11/Basic Tandy 1200 .	89.95	75.00
25-4104 MS-DOS 3.1/Basic/Deskmate Tandy 3000	99.95	85.00

CALL TOLL FREE 1-800-248-3823

For Technical Questions and Information on our complete line of computer accessories and current prices:

CALL 1-517-625-4161

Mon., Wed. & Fri. 9-9, Tues. & Thurs. 9-6, Sat. 9-3

All prices and offers may be changed or withdrawn without notice. Advertised prices are cash prices. C.O.D. accepted ($10.00 charge per carton on C.O.D. Call for further C.O.D. information.) M.C., Visa, add 2%. A.X., add 3%. All non-defective items returned will be subject to 10% restocking fee. Defective items require return merchandise authorization. Call for R.M.A. Number before returning. Delivery is subject to product availability.

PERRY COMPUTERS • 124 SOUTH MAIN STREET • PERRY, MI 48872

Algebra Simplifies and Solves Equations

Algebra, to the best of my knowledge, is the only program that solves equations as *equations*, rather than numerically, although it sometimes says zero is one solution to a particular equation, even while it continues to complete the solution algebraically.

It is somewhat difficult to describe just what it does but a few examples may help make it clear.

If you enter `(X^2-6X)^2-2(X^2-6X)=35`, *Algebra* displays `X^4-12X^3+34X^2+12X-35`. Enter `3-X^2 =2X^2+1`, and you get `3X^2-2=0`.

`5X-2X^2=2` produces `-2X^2+5X-2`; ready to substitute into the standard binomial solution (very hard to write in a recognizable form here, but which goes like this: –B plus or minus the square root of B squared, minus 4AC, all divided by 2A; a formula that stirs memories).

Here is an equation generated by the computer (the previous ones came from a math text): `(F+A-(C-E)-B)*E*A=00`; one solution is `A=0` and the general solution is `A=B-E-F+C`.

Here is one last equation, this one also generated by the computer, which I did not verify: `C/(C+F*B/((F+E-C)/(C+D)))=0` and the solution is `C=0` and `C=E+F`. I spent about 10 minutes on this one and gave up!

Briefly put, *Algebra* simplifies or solves certain equations for any specified variable.

The only changes the user must make to his input equation is to specify every number as a letter, e.g., 23X-3Y must be written as AX-BY because the program treats everything, numbers included, as string variables.

If you don't change all numbers to letters, you often get incorrect-appearing solutions because the answer is written as "ABX" or something similar and, if 'A' and 'B' are left as numbers, you could get something like "12X" when the correct answer is "2X" (1 times 2X).

By specifying the numbers as letters, it is always obvious that the numbers are to be multiplied in the final answer. This is not made clear in the documentation and led to my initial conclusion that there was something wrong with the program (there wasn't).

When starting the program you select three different speeds which turn out to be our old friends, the CoCo speed pokes. These pokes don't work with all CoCos but will work with most and really speed up the operation of this program.

On normal speed I could always solve the equation faster than the computer, and I even kept up with it at high speed, but I am certain my accuracy would suffer if I solved several equations in a row, a problem the computer doesn't have.

The program's author is currently translating this program into machine language, which should greatly speed up execution, although it is now faster than many people who are inexperienced with this sort of problem.

The new version should be sent to the purchasers of the BASIC version when completed.

After selecting the speed the computer can handle, you either enter an equation to solve and then specify which variable to solve for, or you have the computer generate random equations and solve them as a demonstration.

Don't run the auto equation generator on the fastest speed. If you do, you won't be able to tell what is happening. If you get "stuck" in the fastest speed (where the display is garbage during calculations), press the BREAK key and rerun the program. Even though the screen is scrambled, this restarts the program without using the Reset button. When running your own equation in the fastest speed, the program stops at the end of a solution.

I found no bugs in this program and am impressed with the idea behind it.

I have seen better documentation but I can't remember ever seeing worse. The bad grammar, poor spelling, lack of information and generally sloppy appearance of the brief documentation that comes with this fine program are discouraging but shouldn't prevent you from purchasing the product because the program itself is very easy to use.

This is a very interesting program, probably unique in its function, that deserves attention. With some changes to the documentation this would be a fine program for anyone who has the need to solve linear equations or convert higher order equations to a form that can then be looked up in various tables.

It is a bargain and so easy to use that most people will find the instructions more of a minor annoyance than an obstacle. This program isn't flashy or complicated to use; it just sits there and lets your CoCo perform a task it has never been able to do before.

Algebra is the answer to many students' prayers for a program that would "really solve" some of those jumbled masses of numbers and letters that teachers always assign as homework.

The copy of *Algebra* that I received was not copy-protected and after starting the review I was informed that the price had been reduced to $19.95, a giveaway price for this innovative piece of software. At this price I urge anyone with an interest in programming, or any use for this sort of program to buy a copy.

(M F Estes Softhead Co., P.O. Box 335, Elba, NY 14058, requires 32K, cassette or disk $19.95 plus $2.50 S/H)

— John McCormick

Hint . . .

Heads or Tails?

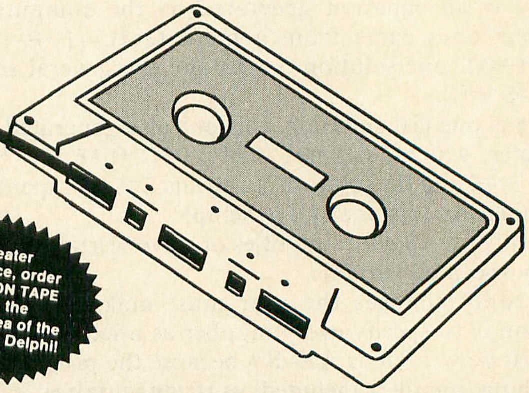
Have you ever wanted to devise a simple "odds/even" or "heads/tails" utility program? If so, this might help:

```
10 RND(2)-1               (YIELDS 0 OR 1)

20 RND(2)>1               (YIELDS 0 OR -1)

30 ((RND(2)>1)*2+1        (YIELDS 1 OR -1)
```

RAINBOW ON TAPE

Enjoy Your RAINBOW Programs with the Greatest of Ease Subscribe to RAINBOW ON TAPE!

Each month, RAINBOW ON TAPE gives you as many as two dozen ready-to-run programs from the current issue of THE RAINBOW, excluding OS-9 programs and those less than 20 lines. With just a one-year subscription, you'll receive more than 230 new programs. And, using the documentation provided by the magazine, all you have to do is load and run them.



For greater convenience, order RAINBOW ON TAPE through the shopping area of the CoCo SIG of Delphi!

Need a back issue of RAINBOW ON TAPE? Issues available beginning with April 1982

Subscribe to RAINBOW ON TAPE Today!

LOOK FOR OUR ORDER CARD BETWEEN PAGES 34 AND 35

The cost for a single copy of RAINBOW ON TAPE is $10 within the United States; U.S. $12 in all other countries. The annual subscription rate for RAINBOW ON TAPE is $80 within the U.S.; U.S. $90 in Canada; and U.S. $105 for all other countries. **U.S. currency *only*, please**. In order to hold down non-editorial costs, we do not bill.

NOW AVAILABLE ON DELPHI!

For your convenience, RAINBOW ON TAPE can also be ordered via the Delphi Information Network, in our Shopping Service area of THE RAINBOW's Color Computer SIG (Special Interest Group).

The individual programs from our past June issues are also available for immediate download in the RAINBOW ON TAPE Database area in THE RAINBOW's Color Computer SIG on Delphi. There is a $3.50 per program surcharge.

RAINBOW ON TAPE is not a stand-alone product, but is intended as an adjunct and complement to the magazine. Even if you purchase RAINBOW ON TAPE, you will still need the magazine for loading and operating instructions.

To order by phone, (*credit card orders only*) call 1-800-847-0309, 8 a.m.-5 p.m. EST. All other inquiries call 1-502-228-4492

Programs from Our Past June Issues:

June 1985 (Sound/Music Issue) — *Piano Note Tutor*, a tutorial on the notes of the piano keyboard; *Minute Waltz*, a music program that brings classical composer, Frederick Chopin up to date; *Name That Song*, a game to test music and memory skills; *Multo of Mars*, a graphics game to learn multiplication; *Chopper Assault*, an arcade game of action; *Analog-To-Digital*, a sound synthesis program to put your voice into memory; *Simplifying the SOUND Command*, a tutorial on saving keystrokes and memory; *Animatic*, a demonstration program to ease the writing of animated graphics; *CoCo Chronograph*, a hardware/software project to add a real-time clock to CoCo; *Hi-Q*, a challenging puzzle peg game of skill; *Super Disk Charger*, a utility to put the "turbo" in your drives; plus 17 additional programs.

June 1984 (Music Issue) — *Tone Row*, a tutorial on 12 note/12 pitch composing; *Music+*, a music synthesis program for composing in four part harmony; *Room Layout*, a home utility to help rearrange furniture; *Election Tabulation*, a vote tallying utility; *Music 1812*, an entertainment program that produces some grand overtures; *Doodler*, a graphics program for CoCo Picassos; *CoCo Classics*, a music program to get a 'Handel' on 'Bach'; *Connect 4*, a game to test your skill; *Guitar Chords*, an aid in producing string music; plus 16 more programs.

Super Duper Utilities
Packs a Punch

Utilities are some of the most popular pursuits of the CoCo hobbyist. Human nature drives us to seek new ways of doing things quicker and easier. Our computers provide the opportunity. The new offering from Microcom Software definitely does some new things quicker. *Super Duper Utilities* is supplied on an unprotected disk and is written for a 32K ECB system. The author, Kishore M. Santwani of *500 Pokes Peeks & Execs* fame, has done a good job. He has used his expertise to make CoCo do some pretty handy tasks, which I have listed here:

40K Disk Basic — A utility that gives 64K disk users 40K instead of the usual 32K of memory. Remember, Disk BASIC needs 2K for its own use, so there is only 38K to work with. Two versions are available, one for Disk BASIC 1.0 and one for version 1.1.

Alphadir — This utility reads the disk directory, then sorts and rewrites it in alphabetical order. This is handy for locating program names as your disk library grows larger.

Basic Search — Enables you to find all BASIC lines where a specified string is located. Very handy to find all those high speed pokes, as an example.

Banner Creator — Lets you create a large banner with seven-inch letters. Baud rate is selectable from the menu, ranging from 600 to 9600.

Disk Encryption — Provides password protection for BASIC programs on disk and keeps unauthorized people from accessing them.

EZ Disk Master — Lets you copy, kill and rename disk files, and to determine the starting, ending and executing addresses for ML programs. You can also run and execute programs directly from the menu.

Function Keys — Allows you to program any numeric keys (0-9) with strings of up to 250 characters each. This can be a very helpful feature during programming. For example, you could press a key and automatically insert "print #-2" in the BASIC line.

Graphics Zoom — This utility is very impressive and easy to use. A menu allows you to look at the picture in memory and to select the area to be magnified four times. You can then modify the magnified area using arrow keys to move the cursor and the space bar for turning the cursor on or off and for modifying the picture.

Large Screen Dump — This program dumps `PMODE 3` or 4 screen images to your DMP printer. The printout runs sideways and is twice the size of the graphics screen.

List/Dir Pause — I really liked this one! By pressing SHIFT/CLEAR, you can make the list pause in full screens instead of flashing by. A second SHIFT/CLEAR returns to the normal mode.

Mailing List — A handy mailing list right where you need it. You can delete or modify the records and sort by ZIP code. It prints to either screen or printer.

Program Packer — Removes all spaces and REM statements from BASIC programs. Reduces the memory requirements of BASIC programs.

Super Input/Line Input — This is a very useful utility and one which most programmers will love. It modifies the keyboard input routine to allow editing without having to access the `EDIT` command each time. Load it in and edit directly with a combination of arrow and CLEAR keys.

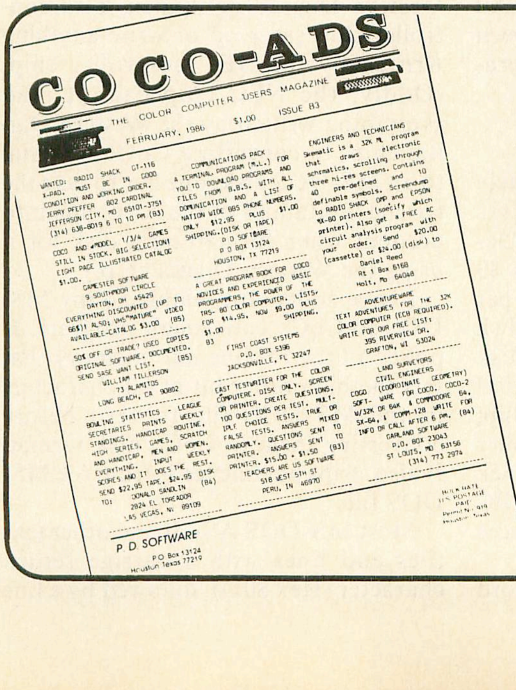
Disk Zapper — This utility allows you to change the data on the disk and recover most of the data in case of a crashed disk.

These utilities are useful and the fact that they are all on one disk makes this program even more appealing. However, in most cases, the user must type in a short BASIC line before actually using the utility.

But, they all work fine and the software is worthy of consideration. It offers helpful utilities at a reasonable price.

(Spectrum Projects, Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, $29.95 plus $3 S/H)

— Jerry Semones



COCO-ADS
THE COLOR COMPUTER USERS MAGAZINE
FEBRUARY, 1986 $1.00 ISSUE 83
P D SOFTWARE
P.O. Box 13124
Houston Texas 77219

TRS-80 COLOR COMPUTER USERS-MAGAZINE

Sell or trade your unwanted programs or hardware in this monthly newspaper. Find great buys. List your club or BBS. Full of tips, articles, reviews and programs for your COCO. Don't delay, subscription starts at only $5.00 per 12 issues (1 year) classified ads only $.15 a word, use seperate sheet of paper for classified ads.

Yes- I would like a subscription to COCO ADS
____ 1 year third class mail $5.00
____ 1 year first class & Canada $10.00

Name ____________________

Address ____________________

City, State ____________________ Zip ________

Please have checks payable to - P D Software
P.O. Box 13124 Houston, Texas 77219

64K
Disk

Converting ASCII text from MS-DOS disks to CoCo disks

The Great Transformation

By Marty Goodman

Much as we love the CoCo, the fact is the IBM PC (and its clones) running Microsoft Disk Operating System (MS-DOS) is by far the most commonly used personal microcomputer for business. Many of you may use one at work, or have friends who use them.

This article is intended to provide you with a means of converting ASCII text files on a disk created using an MS-DOS computer into ASCII text files on a Color Computer-type disk. Next month, a companion article will provide you with the means of creating an MS-DOS-type disk on your Color Computer and the means to write CoCo text files to such a disk.

System Requirements

A 64K Color Computer with Disk Extended BASIC (versions 1.0 or 1.1) and two disk drives are required for these programs. Two drives are needed to allow the file conversions to occur at a reasonable rate of speed. That is why no attempt was made to write this utility for single-drive systems.

The disk drives must be capable of fully accessing 40 tracks. There is no way around this; MS-DOS uses all 40 tracks. Most disk drives sold by third-party suppliers will access 40 tracks, as do most Tandy disk drives manufactured over the last couple of years. Most of the full-height drives Tandy sold in white cabinets will access 40 tracks. All of the half-height drives Tandy has been selling are capable of 40-track operation.

The Problem of File Conversion

The Color Computer differs widely from the IBM PC. The CoCo uses disks formatted with 35 tracks and 18 256-byte sectors per track; the PC uses 40 tracks with nine 512-byte sectors per track. The CoCo uses single-sided disk drives; the PC uses double-sided disk drives. The CoCo uses a Western Digital or Fujitsu brand disk controller chip; the IBM PC uses a NEC disk controller chip. The CoCo uses the Radio Shack Disk BASIC operating system; the PC uses MS-DOS. All of these differences cause problems.

The fact that many IBM PC word processors store files in a form that is not exactly ASCII text causes further complications. You simply have to make sure the files you wish to read on the IBM PC-type disk are pure ASCII text. Most programs that do not normally use pure ASCII for text storage provide, as an option or separate conversion program, the means of turning their file format into pure ASCII.

Working in our favor is the fact that both computers use the same size disk, that Microsoft wrote the code for both MS-DOS and Disk BASIC, and that the Western Digital (or Fujitsu) disk controller chip can read or write anything written by the NEC controller chip. (Oddly, the NEC chip cannot read everything written by the Western Digital chip. In converting CoCo material to an MS-DOS disk, one has to take the special limitations of the NEC chip into account when formatting a disk for it using the Western Digital chip.)

I have added one feature to my MS-DOS-to-CoCo conversion program. It pokes a little routine into memory that sets the high order bit of all characters in the MS-DOS file to zero before converting them to CoCo disk format. It also strips out line feeds from the MS-DOS file.

Most MS-DOS ASCII and other text files end lines with a carrige return character (Hex $0D), followed by a line

---

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator on CompuServe and Delphi. Among his numerous hardware and software designs, production and marketing projects, he introduced Graphicom *and* WEFAX *to the CoCo world. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.*

WE'VE OUTDONE OURSELVES!

DS-69A DIGISECTOR™
THE VIDEO DIGITIZER NOBODY CAN BEAT!

NEW

The DS-69A is the best video digitizer available for your COCO at any price. This new, turbocharged version of our original DS-69 Digisector allows your 64K COCO to see clearly into the world of any television picture.

SPEED!	The fastest — 8 images per second!
PRECISION!	The highest — 64 levels of true grey scale!
RESOLUTION!	The finest — 256 × 256 picture elements!
Compabitibility	Use with a black and white or color camera, a VCR or tuner.
Compactness	Self contained in a plug in Rompack.
Convenience	Use with a Y-cable, Multi-Pak, PBJ Bus or plug directly into the cartridge slot.
Ease of Use	Software on disk will get you up and running fast!

POWERFUL C-SEE™ SOFTWARE

C-SEE is the menu driven software package included with your DS-69A. Available on disk or cassette, it provides lightning fast 5 level digitizing to the screen, high precision 16 level digitizing for superb hard copy printout and simple keyboard or joystick control of brightness and contrast. Or call our driver routines from your own Basic program for easy 64 level random access digitizing. Pictures taken by the DS—69A may be saved on disk or cassette by C-SEE and then edited with COCO MAX, MAGIGRAPH or GRAPHICOM for special effects. Any of the popular printers may be used to obtain printouts of images digitized by the DS-69A.

ONE YEAR WARRANTY

DS-69A Digisector & C-SEE III Software	**$149.95**
OR your DS-69 &	**$ 59.95**
MAGIGRAPH Graphics Editor on disk	**$ 39.95**

DS-69 DIGISECTOR™
THERE'S ONLY ONE BETTER VIDEO DIGITIZER. . .

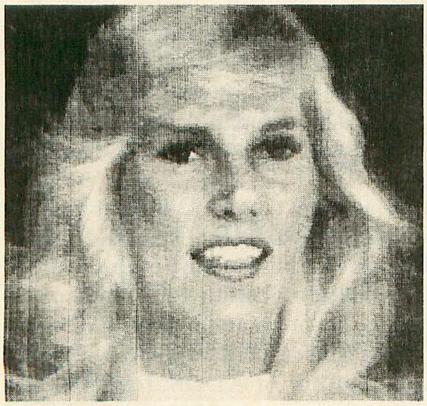
And that's the DS-69A. The DS-69 is The Micro Works' original video digitizer, tried and true since 1984. It provides almost all the features of the DS-69A and is now available at a new low price. **The DS-69 features;**

SLUGGISHNESS	2 images per second. Quick enough to freeze all but the fastest moving pictures.
INCOMPATIBILITY	Brightly colored scenes may be striped when using a color camera.
INCONVENIENCE	Will not work with a Y cable.

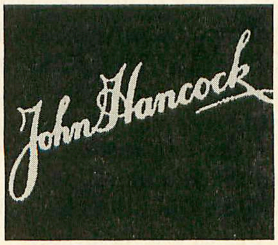
Otherwise, it's a DS-69A. Precision, resolution, compactness, ease of use, software and warranty.
Except one last thing.

DS-69 Digisector & C-SEE III Software	**$ 99.95**

Superb image quality produced by both Digisectors.


Printout

Screen



Screen

NO RISK GUARANTEE

If you are not completely satisfied with the performance of your new DS-69A or DS-69 you may return it, undamaged, within ten days for a full refund of the purchase price. We'll even pay the return shipping. If you can get any of our competitors to give you the same guarantee, buy both and return the one you don't like. We know which one you'll keep.

THE MICRO WORKS
Purveyors of Fine Video Digitizers Since 1977.

Terms: Visa, Mastercard, Check or C.O.D.

P.O. Box 1110 Del Mar, CA 92014 (619) 942-2400

feed character (Hex $0A). But CoCo word processors are accustomed to seeing lines ended *only* by the carriage return. Some CoCo word processors automatically remove any line feeds they may find in a file. *Telewriter-64* is one example. However, some CoCo editors (i.e. the editor for Macro 80C) choke on a file if it contains line feeds. In general, when converting text from an MS-DOS system to a CoCo Disk BASIC system, it is useful, sometimes mandatory, to strip off line feeds. The resetting of the high-order bit to zero should help convert *WordStar* and some other type files into ASCII for compatibility with CoCo word processors and editors.

The "filter" routine that does the line feed and high-order bit stripping is executed in Line 5050. If you want to have the file converted without this filter, just delete Line 5050: load the converter program, then before running the program, type `5050` and press ENTER. This deletes Line 5050 and disables the filter. You may want to save the program with that line deleted.

Program Limitations and Idiosyncrasies

There are several limitations with this file conversion program. First, it can only read single-sided disks (because so few CoCo owners use double-sided disk drives). Virtually all MS-DOS users use double-sided disks. However, originally MS-DOS used single-sided disks, and to maintain backwards compatibility, the current versions of MS-DOS have the ability to read and write single-sided versions of MS-DOS disks. In order to create an MS-DOS disk that can be read by a CoCo with single-sided drives, the user must first format a single-sided disk on the MS-DOS machine. Under MS-DOS, do this with Drive B and give the command FORMAT B: /1.

After prompting you to put a blank disk in Drive B, the computer formats a single-sided MS-DOS disk. You must transfer any files you want converted to that disk. Only MS-DOS disks prepared in this manner can be read by this MS-DOS-to-CoCo conversion program. (It is possible to write a conversion utility to read double-sided [normal] MS-DOS disks on the CoCo, but double-sided drives are required.)

MS-DOS supports volume labels and subdirectories. To keep the conversion program simple, I elected not to write code that took either into account. Therefore, the files you wish to transfer *must* be put in the Root directory of the single-sided MS-DOS disk. This program ignores volume labels, subdirectories and killed files, but I do suggest not having any of these things on the disk you are preparing for file conversion.

Files can be of any length, but the computer reads and writes data a sector at a time. To keep the code simple, I made it convert files a sector at a time and let the last sector in each file be fully converted, even if the file is supposed to include only part of that last sector. The result is that it adds some trash at the end of files it converts, although all of the file does get converted. This extra trash often shows up as part of the original file itself. Indeed, that trash will very often be material from just before the end of the file. But if you look a little farther back, you'll see the true end of the file, followed by up to 255 characters of text, which is a repeat of stuff near the end of the file. The extra trash can be edited out with a word processor.

One note for *Telewriter* users: *Telewriter* does weird things when it encounters a caret sign in incoming text. The caret itself is not displayed, and the character following it is lost or altered. I suggest you make sure there are no caret signs in the text you convert. If need be, first edit the text using an MS-DOS-based word processor on your MS-DOS machine.

> **"I made it convert files a sector at a time . . ."**

Users of *VIP Writer* will need to do a little extra work to prepare their files for loading into the word processor. Unfortunately, *VIP* is set up to interpret a null as an end-of-file marker. This MS-DOS-to-CoCo conversion routine doesn't actually remove the line feeds; it converts them into nulls. Because of this, *VIP* loads only the first line of the converted text. The rest is ignored as the null at the end of the line tells *VIP* it has reached the end-of-the-file.

To correct this, *VIP* users need to delete Line 5050 in the main program. This tells the converter not to strip the line feeds. Then, after the conversion is complete, you can do one of two things: 1) Leave the file as is and edit out the line feeds (the hard way), or 2) Run the file through the program in Listing 2 and answer the prompts. This listing strips the line feeds right out of the file.

Using the Program

First, make up your MS-DOS single-sided disk with MS-DOS ASCII text files you want to convert. Be sure to put all files in the Root directory. Be sure the disk does not have a volume label, subdirectories or a killed file. Put that disk in your CoCo's Drive 1. Put a disk with this conversion program *(MS2COCO.BAS)* in Drive 0. Type `LOAD "MS2COCO"` and `RUN`. Upon seeing the title page, make sure your specially prepared MS-DOS disk is in Drive 1, then press ENTER. Follow the prompts to view all entries on the root directory of the MS-DOS disk. Select the entry you want to convert by typing its number, then pressing ENTER when asked to confirm that selection.

Be sure you have adequate blank space on the Disk BASIC disk in Drive 0. That disk must be formatted in ordinary format — just follow the prompts. After selecting the file on the MS-DOS disk you wish to convert, you are asked to choose a filename for it as it will appear on the CoCo disk. Note that you are only to enter an eight-letter filename; the program automatically assigns the extension "/TXT."

The speed of file conversion is roughly 2400 Baud. This is accomplished by a sneaky programming trick, the "`VARPTR` trick." You might wish to examine the code between 5000 and 5200 to see how the `VARPTR` statement is used to help create a 256-character long string in one fell swoop.

During file conversion some curious numbers appear on the bottom of the screen. These numbers were put there mostly to help debug the program. Going from left to right, they represent the cluster number, track and sector number on the MS-DOS disk that is currently being acted on.

On the right bottom part of the screen you will see a display of the number of bytes that remain to be converted. As the file is converted, that number decreases to zero. The number gives an idea how far along the program is in the process of file conversion. When the program is done converting a file, it prompts with a beep and asks if you are done or if you want to convert another file.

Special thanks go to Don Hutchison (user name DONHUTCHISON on Delphi) for his beta testing of this utility and his help in dealing with line feeds, including the program in Listing 2. Also to Art Flexser (ARTFLEXSER on Delphi), author of ADOS, for his help in suggesting the `VARPTR` trick and for providing a routine from which Don derived the line feed-stripper program. Thanks to Cray Augsburg (RAINBOWMAG on Delphi) for his beta testing that revealed the problems to be encountered by users of *VIP Writer.* Extra special thanks go to Fred Cisin, author of *Xenocopy*, who spent hours patiently teaching me about MS-DOS disk file structure.

Next month we'll present the other half of this package: a group of programs that allow you to format an MS-DOS-type disk on the CoCo and to write Disk BASIC text files onto that MS-DOS disk using the CoCo. A short simple BASIC program will be included that inserts line feeds into CoCo ASCII files after the carriage return, making such files more palatable to MS-DOS-type text handling programs.

For those with other file conversion needs, please take note of the following:

Mark Data Products makes a program called *CoCo Util* that converts to and from Disk BASIC on an MS-DOS-type machine. (Note that this is an MS-DOS program and runs only on MS-DOS machines.) It does, of course, support double-sided MS-DOS disks. Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, (714) 768-1551.

D.P. Johnson makes conversion utilities to handle file conversions between OS-9 and MS-DOS disks. These utilities run on the Color Computer under OS-9 and support double-sided disk drives. D.P. Johnson, 7655 S.W. Cedarcrest Street, Portland, OR 97223, (503) 244-8152.

For those with an IBM PC or other MS-DOS machine who wish the ultimate in file conversion utilities, let me recommend *XENOCOPY II.* It runs on nearly all MS-DOS machines, and reads from, writes to and formats over 250 different disk formats. This includes OS-9, Color Computer and hundreds of CP/M variant formats. If you obtain special hardware, this conversion program also supports a number of eight-inch and 3½-inch disk formats. *Xenocopy II* is available from Xenosoft, 1454 6th Street, Berkeley, CA 94710, (415) 525-3113. ☐

47	227	3043	21
200	79	9030	110
445	21	10090	51
610	104	13003	178
750	190	END	144
2110	161		

Listing 1: MS2COCO

```
1 CLEAR 512,&H5DFF
2 PCLEAR 4
3 DIM LKS(8)
5 DIM NTRYLC(8)
20 IS=&H60:ID=&H6000 'MS DOS DAT
A SECTOR BUFFER
25 FS=&H62:FD=&H6200 'FAT BUFFER
30 DS=&H66:DD=&H6600 'MS DOS DIR
ECTORY BUFFER
35 DEND=&H71FF 'END OF DIRECTORY
40 POKE &H7E00,&H8E:POKE &H7E01,
&H60:POKE &H7E02,0 'LDX #$6000
41 POKE &H7E03,&HA6:POKE &H7E04,
&H84 'LDA 0,X
42 POKE &H7E05,&H81:POKE &H7E06,
&H0A 'CMPA #$0A
43 POKE &H7E07,&H26:POKE &H7E08,
&H03:POKE &H7E09,&H4F 'BNE $7E0C
 CLRA
44 POKE &H7E0A,&H20:POKE &H7E0B,
&H02:POKE &H7E0C,&H84:POKE &H7E0
D,&H7F  'BRA $7E0E  ANDA #$7F
45 POKE &H7E0E, &HA7:POKE &H7E0F
,&H80  'STA ,X+
46 POKE &H7E10,&H8C:POKE &H7E11,
&H62:POKE &H7E12,&H00  'CMPX #$6
200
47 POKE &H7E13,&H25:POKE &H7E14,
&HEE:POKE &H7E15,&H39 'BCS $7E03
 RTS
49 REM DELETE STEP 5050 TO KILL
THE FILTER.
60 H=PEEK(&HC004):L=PEEK(&HC005)
:DKON=256*H+L
100 CLS:PRINT@32," MS DOS TO COC
O TEXT FILE XFER"
105 PRINT" FOR SINGLE SIDED MS D
OS DISKS"
110 PRINT:PRINT" (C) MARTY GOODM
```

At Last — **INTERCOMP SOUND** presents:

PROFESSIONAL MIDI PRODUCTS FOR THE COLOR COMPUTER!!

At InterComp our objective is to support Midi hardware/software for the Color Computer to the fullest. Within the next year or so you can expect a variety of products such as librarian/patch programs (Korg, Yamaha, Casio, etc. . .), graphics editor and system exclusive software. Don't go out and buy another computer for your MIDI system!!!!! Our products are designed with the professional in mind, be it for studio, performance, home recording or music education. Here is the start of more to come!

COLOR MIDI CONNECTION — This interface plugs into the cartridge slot. It contains 3 Midi outputs, 1 Midi input, and a female connector for the disk controller (no Y-cable is required) $98.00.

SYNTRAX 1.00 — With this sequencer you will quickly control your Midi system! Major features include: 16 polyphonic tracks, interactive editor, 30,000 bytes for note storage, independent repeats for any track, all midi channel control data (program changes, channel #, velocity, pitch wheel, etc.), int/ext sync for Midi drum machines (or another sequencer), programmable tempo, transposition, clefs, key signatures, chords, complex rhythms, use up to 4 disk drives, sequence chaining and linking, notes/Midi-events can be specified with a resolution of 1/384 note! Requires 64K, disk drive, COLOR MIDI CONNECTION — $75.00.

SYNTRAX 2.00 — All the features of SYNTRAX 1.00 plus: real/step time record (notes, velocity, program changes, and controllers), input filtering, programmable split points, punch in/out anywhere, easy and quick editing of Midi data, supports J&R's **512K** upgrade for a tremendous amount of storage for recording! $125.00 (Customers that already have SYNTRAX 1.00 can upgrade to ver. 2.00 for $50)

SYNLIB 1.0 — Expandable Multi-Instrument Voicing Librarian. Buy what you need, when you need it. Includes pull down menus, SYNTRAX 2.0 compatibility and ease of expandability to set up the studio instantly. Synlib with one librarian Module — $45. Roland TR707/727 Lib. Module — $20.00. Korg EX800 Lib. Module — $20. Yamaha, Casio Lib. Modules Avai. soon!

Include $3 for shipping (CODs add $2). Residents of N.Y. state add sales tax. Mail check or money order to:

INTERCOMP SOUND
129 LOYALIST AVE
ROCHESTER, NY 14624
Phone: 716-247-8056

```
AN JAN 1, 1986":PRINT
115 PRINT"FOR EITHER 8 OR 9 SEC
/ TRK."
120 PRINT"ONLY ROOT DIRECTORY FI
LES CAN"
125 PRINT"BE CONVERTED.  FORMAT
THE DISK"
130 PRINT"YOU WILL PUT THE MS DO
S FIES"
135 PRINT"ON USING THE COMMMAND:
":PRINT
140 PRINT" FORMAT B: /1"
145 PRINT:PRINT" PLACE SINGLE SI
DED MS DOS DISK"
150 PRINT"    IN DRIVE 1 AND TAP
ENTER";
190 IF INKEY$ <> CHR$(13) THEN G
OTO 190
200 REM READ IN FIRST SECTOR OF
FAT
210 POKE &HEA,2:POKE &HEB,1:POKE
 &HEC,0:POKE &HED,2:POKE &HEE,FS
:POKE &HEF,0
220 EXEC DKON
230 IF PEEK(&HF0)<>0 THEN GOTO 9
000
300 REM CHECK FOR 8 VS 9 SECTOR
PER TRACK
310 GN=0:GOSUB 15000:T=CV AND 15
320 TS=0
330 IF T=&HE THEN TS=8
340 IF T=&HC THEN TS=9
350 IF TS=8 THEN GOTO 400
360 IF TS=9 THEN GOTO 450
370 CLS:PRINT@256-29,"WRONG KIND
 OF MS DOS DISK"
380 PRINT" TAP ENTER TO RESTART
PROGRAM"
390 IF INKEY$<>CHR$(13)GOTO 390
395 GOTO 100
400 REM INPUT 8 SEC /TRK DIRECTO
RY
410 FOR N=4 TO 7
420 POKE &HED,N
430 POKE &HEE,DS+(2*N)-8
435 EXEC DKON
440 IF PEEK(&HF0)<>0 THEN GOTO 9
000
445 NEXT N
447 GOTO 500
450 REM INPUT SECOND FAT SECTOR
AND ALL OF DIRECTORY
455 FOR N= 5 TO 9
460 POKE &HED,N
465 POKE &HEE,DS+(2*N)-12
470 EXEC DKON
```

E.T.T. Electronic Typing Teacher
by CHERRYSoft

Learning to type the right way can save you hours of tedious work when entering programs into your CoCo, and this is just what ETT was designed to do. Devote a little time every day practicing with ETT and before you know it you will be typing with confidence. Entering those programs will no longer be the chore it use to be.

ETT's video keyboard lets you practice with all the keys labeled, all the keys blank or only the "home" keys labeled. The visual cues guide you while you learn to type without watching your fingers. ETT shows your accuracy, response time, and words per minute. You will quickly see that you are improving with practice.

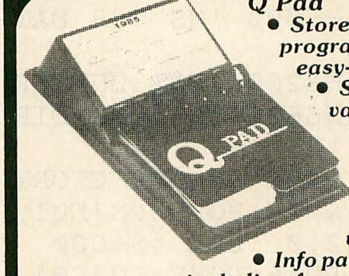
With the sentences provided by ETT learning to type can be fun. Over 1000 variations chosen because they include every letter in the alphabet. You can also create your own practice sets. This outstanding program was written by a certified teacher and professional programmer and comes with a ten page student manual-study guide. Requires 16K Extended Basic.

Cassette $24.95 FREE SHIPPING Disk $29.95

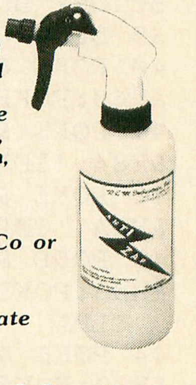
ETT is being used in schools throughout the U.S.
See ETT at your favorite dealer or order direct.
DEALER INQUIRES INVITED

MasterCard VISA CoCo Warehouse
Where Shopping By Mail is "USER FRIENDLY"
500A N. DOBSON · WESTLAND, MI 48185
Phone (313) 722-7957

Q Pad & Anti-Zap



Q Pad
- *Stores & helps organize your programming notes & hints in one, easy-to-use file*
- *Saves precious time & valuable table space*
- *Holds up to 24 colorful, ½-cut index pages (8 supplied with order)*
- *Info paks available including 4-year calendar, some BASIC programming information, and instructions*
- *Q-Pad (with 8 pages) $14.95*
- *8-page sets of extra pages $5.95/set*
- *Calendar or Info Paks (specify CoCo or Model I or III) $3.95 ea.*



Anti-Zap
- *Anti-static spray concentrate*
- *w/16 oz. bottle $3.95*
- *4-time Refill $3.95*

Send For Free Catalog Of CoCo Software & Computerware
- *For Fastest Service Send Money Order Or Certified Check*
- *Add $2.50 Shipping For Continental U.S.*
- *Add $4.00 Shipping For: AK, HI, APO's, P.O. Boxes, & Canada*
- *Add $15.00 Shipping For Overseas*
- *Add $3.00 For 220-250 Volt Model*
- *California Residents Add 6½% Sales Tax*
- *Add $3.00 For C.O.D.*

REM Industries, Inc.
9420 "B" Lurline Ave., Chatsworth, CA 91311
(818) 341-3719

```
475 IF PEEK(&HF0)<>0 THEN GOTO 9
000
480 NEXT N
490 GOTO 500
500 REM PUT DIR ON SCREEN
510 K=0:LKS(0)=0:Z=0
515 REM LOOP
520 CLS:PRINT@8,"DIRECTORY LISTI
NG"
530 PRINT@64,"   FILENAME.EXT
  SIZE"
540 GOSUB 13000
550 IF FE=0 THEN GOTO 700
555 IF Z=0 THEN GOTO 750
560 F$="M" 'MIDDLE OF DIR
570 PRINT@512-96,"   ENTER CHOIC
E NUMBER OR"
580 PRINT"   UP OR DOWN ARROW TO
 SEE"
590 PRINT"   PREVIOUS OR NEXT CH
OICES";
595 F$="M"
600 Z=Z+1:LKS(Z)=K
610 A$=INKEY$
615 IF A$="" THEN GOTO 610
620 IF A$=CHR$(10) THEN GOTO 680
625 IF A$=CHR$(94) THEN GOTO 660
627 IF VAL(A$)=0 THEN GOTO 610
630 IF VAL(A$)>Q THEN GOTO 610
635 CLS:VV=VAL(A$)-1:GOSUB 16000
:GOSUB 17000
640 PRINT@32,"YOU HAVE CHOSEN:"
645 PRINT:PRINT NAM$,FZ
650 PRINT:PRINT"HIT ENTER TO PRO
CEED, OR"
652 PRINT"ANY OTHER KEY TO RETUR
N TO MENU."
656 A$=INKEY$:IF A$="" GOTO 656
657 IF A$=CHR$(13) THEN GOTO 200
0
659 Z=Z-1:K=LKS(Z):GOTO 515
660 IF FE=0 THEN GOTO 610
662 K=LKS(Z):GOTO 515
680 IF Z=1 THEN GOTO 610
682 Z=Z-2:K=LKS(Z): GOTO 515
700 PRINT@512-96,"   END OF DIRE
CTORY"
710 PRINT"   ENTER SELECTION OR
DOWN ARROW"
720 PRINT"   TO SEE PREVIOUS PAG
E";
730 GOTO 600
750 PRINT@512-96,"   TOP OF DIRE
CTORY"
760 PRINT"   ENTER SELECTION OR
UP ARROW";
```

About Your Subscription

Your copy of THE RAINBOW is sent second class mail. If you do not receive your copy by the 5th of the month of the publication date, send us a card and we will mail another. Canadian subscribers and foreign airmail allow two additional weeks.

You must notify us of a new address when you move. Notification should reach us no later than the 15th of the month prior to the month in which you change your address. Sorry, we cannot be responsible for sending another copy when you fail to notify us.

Your mailing label also shows an "account number" and the subscription expiration date. Please indicate this account number when renewing or corresponding with us. It will help us help you better and faster.

For Canadian and other non-U.S. subscribers, there may be a mailing address shown that is different from our editorial office address. Do not send any correspondence to that mailing address. Send it to our editorial offices at Falsoft, Inc., The Falsoft Building, P.O. Box 385, Prospect, KY 40059. This applies to everyone *except* those whose subscriptions are through our distributor in Australia.

ADOS ENHANCED, EPROM-ABLE DISK BASIC

Now, you can supercharge Basic with an impressive array of extra features WITHOUT sacrificing compatibility! ADOS is compatible with virtually 100% of commercial software. Customizing utilities are provided to allow user-defined command abbreviations, baud rate, step rate, tracks per disk (35 or 40), support of double-sided drives, and more. After customizing ADOS, you can have it burned into an EPROM that plugs into the Disk Basic ROM socket, or just use it in RAM as a 64K disk utility. (EPROM + burning will cost about $20--we provide information concerning how you can have this done.) Features include: • repeat and edit of the last direct-mode command • 26 definable control-key abbreviations • automatic line-number prompts • DOS command • lowercase command entry (a fine complement to a Lowerkit or PBJ WordPak) • COPY (filename) to (drive number) • AE error override option • RAM command (64K) • RUNM command • text echoing to printer • ML monitor • text file scan • enhanced directory • error trapping • hi-res text utility included (42, 51, or 64 characters per line)

"I COULD NOT FIND ANY SOFTWARE THAT WOULD NOT RUN UNDER ADOS."
THE RAINBOW, December 1984
"I LOVE ADOS! . . . A GENUINELY FIRST RATE PRODUCT."
Color Micro Journal, February 1985
"I WON'T PART WITH MY ADOS EPROM FOR ANYTHING . . . NO COMPATIBILITY PROBLEMS."
Hot CoCo,May 1985

Disk . . . $27.95

THE PEEPER ML PROGRAM TRACER

Monitor machine-language programs AS THEY ARE RUNNING! Peeper actually timeshares with the target program, giving FULL CONTROL as ML programs run. Switch instantly between watching regular program output and Peeper's trace of registers and stack on screen or printer. Inspect memory in any of 26 display modes. Execution speed can be varied from full speed to the barest crawl, or halted entirely, as programs run. Single-stepping, breakpoints, memory or register examine/change. Relocatable, supports 64K use. (16K required) See February '85 review.

Disk . . . $23.95 Tape . . . $21.95 Assembler source listing . . . Add 3.00

FASTAPE THE NEXT BEST THING TO A DISK DRIVE

Fastape allows cassette I/O at 3000 baud--TWICE NORMAL SPEED. It uses the high-speed (POKE 65495,0) mode, and makes it convenient to stay in this mode throughout. Features automatic adjustment of cassette and printer parameters when speed mode is changed. Control-key functions for many Basic commands and for changing speed modes. Compatible with all file types, and can be used with Telewriter 64 and many other tape utilities. (16K required) See July '83 review.

***Tape . . . ~~$21.95~~ $11.95 (NEW DISCOUNT PRICE!)**

SPECTROSYSTEMS
11111 N. Kendall Drive
Suite A108
Miami, Florida 33176
(305) 274-3899 Day or Eve

No delay on personal checks
Please add $2.00 shipping. Sorry, no credit cards or COD's

```
780 PRINT"   TO SEE MORE ENTRIES
";
790 GOTO 600
2000 REM FILE TRANSFER SECTION
2020 HCLU=40*TS
2030 CLS:PRINT@32,"PUT COCO DISK
 IN DRIVE 0"
2040 PRINT"AND INPUT A FILE NAME
"
2045 PRINT"USE UP TO 8 LETTERS A
ND"
2050 PRINT"DO NOT USE AN EXTENTI
ON!"
2060 PRINT:INPUT CFN$
2070 IF CFN$="" THEN GOTO 2030
2075 IF LEN(CFN$)>8 THEN GOTO 20
30
2080 OPEN "O",1,CFN$+"/TXT:0"
2090 CURCLU=BC
2092 IF TS=8 THEN QQ=5
2093 IF TS=9 THEN QQ=7
2095 ZCLU=INT (FZ/512)+1
2097 CLS:PRINT@256-32,"   NOW TR
ANSFERRING THE FILE"
2098 PRINT@512-96,"CLUSTER TRACK
 SECTOR #BYTES"
2100 FOR M=1 TO ZCLU
2110 IF CURCLU>HCLU THEN M=M+1:G
OTO 2260
2120 X=CURCLU+QQ:T=INT(X/TS):S=X
```

THE NEXT PHASE OF ADVENTURE GAMES HAS FINALLY ARRIVED!

Zytek

presents

View your movements in the unique map window!

This extensive game uses an entire diskette!

Plateau of the Past

Actual screen graphic!

100% machine language HI-RES, color, graphic adventure!

Battles orchestrated blow by blow!

Are you tired of being forced to constantly type directions or pick up and put down provisions? Are you frustrated at discovering the right logic only to be stumped by the game's vocabulary? **Plateau of the Past** eliminates these annoyances without sacrificing excitement. If you enjoy the challenge of a fast-paced adventure, then this game is for you!

Prepare yourself! The journey ahead of you will surely be perilous. You are hereby forewarned of possible encounters with strange beasts! If you survive these dangers, you must still find the missing idols and attempt to reach the forbidden village. Good luck, you'll need it!

Terms: Cash, Check, COD, VISA and MASTER CARD
ADD $2.00 Shipping & Handling US and Canada
ADD $5.00 Shipping & Handling outside the US and Canada
ADD $3.00 COD charge
Illinois residents add 6.25% sales tax
Software Authors, call or write for info.

ZYTEK LTD.
P.O. BOX 701
BLUE ISLAND, IL
60406

Plateau of the Past
$26.95 32K DISK ONLY
Call Mon. thru Sat. (9-5)
(312) 597-1919
Also order by mail

```
-TS*T+1
2130 PRINT@480+2,CURCLU;:PRINT@4
80+20,FZ-(512*(M-1));
2140 GN=CURCLU:GOSUB 15000:CURCL
U=CV
2200 GOSUB 5000
2210 IF CURCLU=0 THEN GOTO 190
2220 IF CURCLU>HCLU THEN GOTO 22
50
2230 NEXT M
2240 GOTO 3000
2250 IF CURCLU=&HFFF THEN M=M+1
2260 NEXT
2270 GOTO 3000
3000 PRINT #1,CHR$(&H0D);
3005 PRINT#1,CHR$(&H1A);
3010 CLOSE
3015 PRINT@480+20,"      ";:PRINT
@480+20,LB;
3020 SOUND 100,10
3030 PRINT@256-32,"          TRAN
SFER DONE          "
3040 PRINT" TAP ENTER TO TRANSFE
R MORE  "
3043 PRINT" TAP ANY OTHER KEY TO
 EXIT"
3045 A$=INKEY$
3050 IF A$="" THEN GOTO 3045
3060 IF A$=CHR$(13) THEN GOTO 10
0
3070 CLS:END
5000 REM INPUT SECTOR TO BUFFER
5010 PRINT@480+9,T;:PRINT@480+15
,S;
5020 POKE &HEA,2:POKE &HEB,1:POK
E &HEC,T:POKE &HED,S:POKE &HEE,I
S:POKE &HEF,0
5030 EXEC DKON
5040 IF PEEK(&HF0)<>0 THEN GOTO
9000
5050 EXEC &H7E00
5060 A$=""
5065 P=VARPTR(A$)
5070 POKE P,128
5075 FOR Y=0 TO 3
5080 Z=ID+Y*128
5085 GOSUB 5200
5090 POKE P+2,MSB:POKE P+3,LSB
5100 PRINT#1,A$;
5110 NEXT Y
5130 RETURN
5200 MSB=INT(Z/256)
5210 LSB=Z-MSB*256
5220 RETURN
9000 REM PRINT DISK I/O ERROR
9020 CLS:PRINT@256-32,"        DIS
K ERROR ... SORRY!"
9030 PRINT" TAP ENTER TO RESTART
 PROGRAM"
9040 IF INKEY$<>CHR$(13) GOTO 90
40
9050 GOTO 100
10000 REM GET INFO FROM DIR
10001 REM NT IS ENTRY NUMBER
10002 REM NAM$=FILENAME ON EXIT
10003 REM F1=7 IF INVALID ENTRY
10004 REM F1=0 IF VALID ENTRY
10005 REM F1=1 IF SUBDIR
10006 REM F1=2 IF KILLED FILE
10007 REM F1=3 IF FREE (END  OF
DIR)
10008 REM F1=4 IF ENTRY POINTS
BEYOND THE BUFFER SPACE.
10009 REM BUFFER SPACE IS FROM
$6600 THRU $71FF (6 SECTORS)
10010 REM OR 96 TOTAL ENTRIES.
10011 RE A=ATTRIBUTE BYTE
10015 ZZZ$=CHR$(&HE5)+STRING$(7,
CHR$(&HF6))
10020 DLOC=DD+32*NT
10030 IF DLOC>&H71FF THEN F1=4:R
ETURN
10040 FB=PEEK(DLOC)
10060 IF FB=0 THEN F1=3:RETURN
10070 NAM$=""
10080 FOR N=0 TO 7
10090 NAM$=NAM$+CHR$(PEEK(DLOC+N
))
10100 NEXT N
10104 IF NAM$=ZZZ$ THEN F1=3:RET
URN
10105 IF FB=&HE5 THEN F1=2 :RETU
RN
10110 NAM$=NAM$+"."
10120 FOR N=8 TO 10
10130 NAM$=NAM$ +CHR$(PEEK(DLOC+
N))
10140 NEXT N
10145 F1=0
10150 A=PEEK(DLOC+11)
10155 T=A AND &H10:IF T<>0 THEN
F1=1
10160 T=A AND &H08:IF T<>0 THEN
F1=7
10200 RETURN
11000 REM FOR GIVEN ENTRY NUMBER
11001 REM GET FILE SIZE (FZ)
11002 REM AND BEGIN CLSTR (BC)
11010 DLOC=DD+NT*32
11020 FZ=PEEK(DLOC+28)+PEEK(DLOC
+29)*256+PEEK(DLOC+30)*65536+PEE
K(DLOC+31)*65536*256
11030 BC =PEEK(DLOC+26)+PEEK(DLO
C+27)*256
11040 RETURN
13000 REM GET 8 DIR ENTRIES
```

```
13002 REM Q=VALID ENTRY COUNT
13003 REM K=KOUNT OF ALL ENTRIES
13004 REM FE=255 IF MORE NTRIES
13010 Q=0:FE=255
13013 SCST=128
13015 REM LOOP
13030 NT=K
13040 GOSUB 10000:GOSUB 11000
13050 IF F1<>0 GOTO 13200
13100 NTRYLC(Q)=DLOC
13107 PRINT@SCST+32*Q,Q+1
13110 PRINT@SCST+3+Q*32,NAM$
13115 PRINT@SCST+19+Q*32,FZ
13120 Q=Q+1
13200 K=K+1
13210 IF F1=3 THEN FE=0:RETURN
13220 IF DB+32*K>DEND THEN FE=0:
RETURN
13230 IF Q>7 THEN RETURN
13240 GOTO 13015
15000 REM READ FAT
15001 REM GN =CLUSTER ENTRY#
15002 REM GN=0 TO 440
15003 REM CV = CONTENTS OF THE
CLUSTER NUMBER REQUESTED
15010 GIN=INT(GN/2)
15020 GCN=3*GIN
15030 GF=GN-2*GIN
15040 B1=PEEK(FS*256+GCN)
15050 B2=PEEK(FS*256+GCN+1)
15055 B3=PEEK(FS*256+GCN+2)
15060 N1=(B1 AND &HF0)/16
15070 N3=(B2 AND &HF0)/16
15080 N5=(B3 AND &HF0)/16
15090 N2=B1 AND &HF
15100 N4=B2 AND &HF
15110 N6=B3 AND &HF
15120 IF GF=0 GOTO 15200
15150 CV=N3+N6*16+N5*256:RETURN
15200 CV=N2+N1*16+N4*256:RETURN
16000 DLOC=NTRYLC(VV):GOTO 10030
17000 DLOC=NTRYLC(VV):GOTO 11020
```

Listing 2: STRIPLF

```
10 'LINEFEED STRIPPER
20 'BY DON HUTCHISON [70425,1225
]
30 'ADAPTED FROM A PROGRAM BY AR
T FLEXSER, MARCH 1986
40 '
50 'MODIFIES ASCII FILES BY DELE
TING THE LINEFEEDS
60 '
70 CLEAR 200,&H7DFF
80 FOR I=&H7E00 TO &H7E29: READ
P$:POKE I,VAL("&H"+P$): NEXT
90 DATA 8D,A,8D,1D,81,A,27,F8,8D
,9,20,F4,C6,1,D7,6F,7E,C5,97
100 DATA C6,2,D7,6F,AD,9F,A0,2,F
,6F,6E,9F,A0,2,D,70,27,4,F,6F
110 DATA 32,62,39
120 IF PEEK(&HC004)<>&HD6 THEN P
OKE &H7E12,&HC4 'For 1.1 ROM
130 CLS: PRINT: PRINT: PRINTTAB(
8)"LINEFEED STRIPPER": PRINT
140 LINEINPUT "NAME OF INPUT FIL
E: ";I$
150 LINEINPUT "NAME OF OUTPUT FI
LE: ";O$
160 OPEN "I",#1,I$
170 OPEN "O",#2,O$
180 EXEC &H7E00
190 CLOSE #2: CLOSE #1
200 END
```

TOTHIAN SOFTWARE

TIME MASTER Calendars, biorhythms, human compatibility, more. Fun at parties. Printer optional. Reviewed 12/85. 16K ECB. $19.95

PERPETULIFE Challenging board game based on Life. Play a friend or play (lose to) CoCo. Reviewed 4/86. 16K ECB/ML. $19.95

GRAPHIC ECHO New! Versatile graphic screen dump for RS dot matrix printers. Regular or enlarged images. Positive or negative images. Adjustable margin or auto-centering. Works in all 5 PMODEs. 16K/32K ML. $14.95

TEACHER PAK PLUS The works for teachers. $47.95

HOMEWARE New! Give your CoCo real power at home. Printer preferred. Works with tape or disk. Five 16K ECB/ML modules:
CALENDAR - Draw calendars for any date. Various formats. Add appointments, memos.
SAVINGS/LOANS - Work out a personal savings plan. Decide if you can afford that loan.
DIRECTORY - Keep track of phone numbers, addresses, etc. Print address labels.
INVENTORY - For home insurance records, hobbies, small business. Very flexible.
HOME-WRITER - ML word processing powerful enough for home use but easy enough to be totally mastered in one short sitting.
Single modules: $19.95 Whole set: $49.95

All programs sold on tape. Send check or money order, no cash (Pa. residents add 6%) to:

RAINBOW CERTIFICATION SEAL

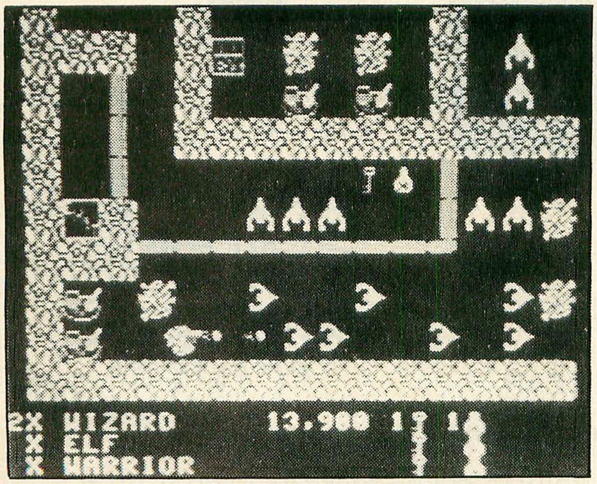
Tothian Software, Inc.
Box 663
Rimersburg, Pa. 16248

RAINBOW CERTIFICATION SEAL

All of these programs carry the Rainbow Seal.

DIECOM PRODUCTS

GANTELET

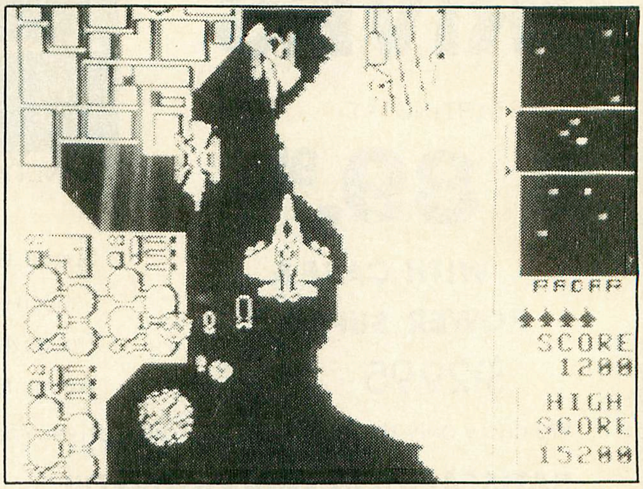


One, two or even three people can play Gantelet at the same time. You and your friends travel through the many levels in search of an exit to the next level. Avoid the Ghosts and other creatures that are out to stop you in your quest. Collect keys to open doors, treasures and magic potions to aid you in your battle. Watch out for hidden traps as you frantically search for the exit to the next level.

64 k required
tape or disk

$28.95 U.S.
$38.95 Can.

Mission: F-16 ASSAULT

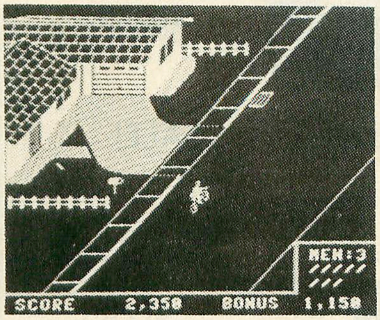


Fly your plane over land and water while avoiding enemy missiles, planes and helicopters attacking from the top and bottom of the screen. Use your radar to track objects as they approach the main screen. Bomb oil refineries, airports and destroy planes before they can take off from the airports. Watch out for missiles fired from hidden missile silos on the ground. Dozens of screens of detailed terrain plus increasing difficulty make this a great game for everyone.

64 k and joystick required
tape or disk

$28.95 U.S.
$38.95 Can.

PAPER ROUTE

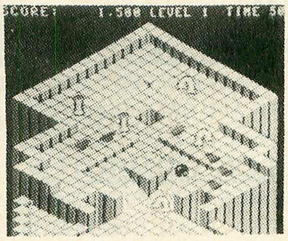


As a paper boy, you ride your bike along your route delivering papers to your customers. Break customers' windows or damage their property and they will cancel their subscriptions! Earn bonus points by damaging non-subscribers' property. Avoid pedestrians, cars, and maybe even a mad dog in your attempt to deliver all of your papers! Detailed graphics and lots of surprises make this game a real challenge for everyone.

64 k
joystick required
tape or disk

$28.95 U.S.
$38.95 Can.

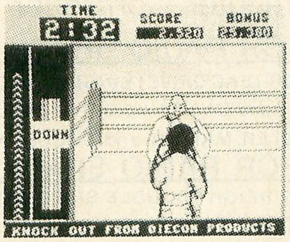
MARBLE MAZE



Move your marble around the mazes in your search for the finish line! Avoid marble eaters, acid puddles and other creatures that inhabit the mazes. Eight different levels and great graphics make this game a must for your collection.

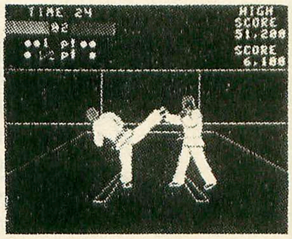
joystick required

KNOCK OUT



Fight against five different boxers in this great boxing game! At first the boxers are easy to knock out, but beware, it gets harder as you move on. The boxers are out to stop you in your quest to become champion of the world. Outstanding graphics make this a must for your collection!

KARATE



Challenge the computer, or a friend to a Karate match! Use various Karate punches and kicks to knock your opponent down and earn points to win the match. When challenging the computer, your opponent's Karate skills increase as you win matches. This game is a challenge for even the expert game player.

joystick required

64 k required **tape or disk** **$28.95** U.S. **$38.95** Can.

COMING SOON:
Mission:
RUSH'N ASSAULT

DIECOM PRODUCTS

6715 FIFTH LINE, MILTON, ONT., CANADA L9T 2X8

We accept:
VISA
MasterCard
cheque or money order

24 hr. order line:
(416) 878-8358
personal service 9-5

Please add $2 for shipping & handling. Ontario residents add 7% sales tax.
C.O.D. Canada only.
Dealer inquiries invited
Looking for new software.

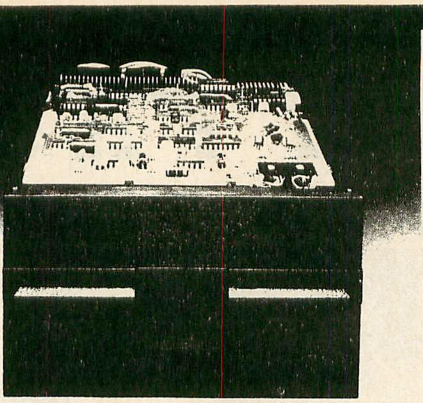
NEW DISK DRIVES

STARTING AT

$ 89.95

WITH CASE & POWER SUPPLY

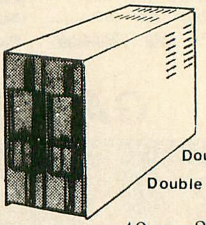
$129.95



TANDON MPI TEAC

Speed 6 ms tk to tk and up
Capacity 250k unformatted
Tracks 40
Warranty **now 1 YEAR**

New Low Price!



40 or 80 Tracks
1/2 Hght. Teac/Panasonic

CALL FOR SALE PRICES

We carry only the finest quality disk drives * no seconds * no surplus

SATISFACTION GUARANTEED!! ALL DRIVES FULLY TESTED & WARRANTEED

Complete Disk Drive with Power Supply & Case .... Teac $129.95
Two Drives in Dual Case & Power Supply .... Teac ...... ~~$279.95~~ CALL
Tracks 40
1/2 ht double sided double density Disk Drives (Panasonic/Teac) $ **$119.95**
1/2 ht double sided double density Disk Drive with ps & case ..... ~~$199.95~~ CALL

free How to use your new drive system on audio cassette

Single ps & case $44.95 Dual 1/2 ht ps & case ..... $54.95 Dual ps & case ... **Call**

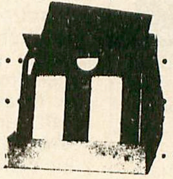
Color Computer Controller (J&M) **$129.95**

DRIVE 0 FOR RADIO SHACK COLOR COMPUTER
TANDON, MPI OR TEAC DRIVE (SINGLE SIDED 40 TRACKS SPEED 5 MS TRK TO TRK & UP)
POWER SUPPLY and CASE, TWO DRIVE CABLE WITH ALL GOLD CONNECTORS
J&M CONTROLLER, MANUAL and DOCUMENTATION .... ~~$249.95~~ ...... $ SALE!

BUY THE BEST FOR LESS! CALL!

DRIVE 0 FOR RADIO SHACK COLOR COMPUTER
PANASONIC 1/2 HEIGHT DOUBLE SIDED DOUBLE DENSITY DRIVE 500K unformatted
POWER SUPPLY and CASE, 2 DRIVE CABLE WITH ALL GOLD CONNECTORS
J&M CONTROLLER, MANUAL and DOCUMENTATION .... ~~$279.95~~ Super!! .... SALE!

TAKE ADDED SAVINGS ON TWO DRIVE SYSTEMS



10 Diskettes
DISKETTES with free library case .... CONTROL DATA $17.95
Unadvertised Specials .... $Call
Drives cleaned, aligned & tested $29.95

TECHNICAL STAFF ON DUTY, PLEASE CALL FOR ASSISTANCE.

CALL US TODAY!! (617) 234-7047
ORDER TOLL FREE **1-800-635-0300**

* DEALER INQUIRIES INVITED.
(617) 234-7047

TDP

TRUE DATA PRODUCTS

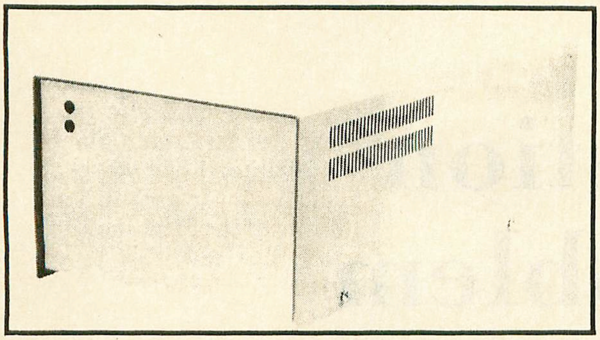
195 Linwood Street, P.O. Box 546
Linwood, Massachusetts 01525
(617) 234-7047
HOURS MON-SAT 9-6 (EST)

We welcome
- Visa / Master Charge VISA MasterCard
- Checks (allow 2 weeks for clearing)
- C.O.D. Add $2.00

New Hard Drives

---------- COMPLETE SYSTEM ---------- JUST PLUG IN ----------

Call For
BEST PRICE



Warranty - One Full Year

5 to 20 Megabyte, ready to run on the TRS 80 Model I/III/IV/4P, color computer,

64K UPGRADES $39.95

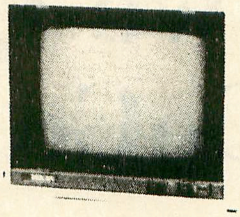
NEW

QUALITY VIDEO MONITORS

Starting at **$79.95**

MONOCHROME

COLOR MONITORS



VIDEO DRIVER

ENABLES YOUR COCO TO OPERATE WITH A VIDEO MONITOR INSTEAD OF A TELEVISION!

SCREEN DUMP PROGRAM

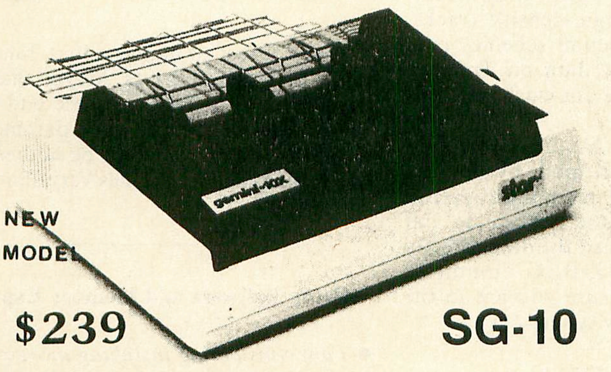
The best screen dump program for the Epson & Gemini printers ever!! Have the option of standard images or reverse w/regular or double sized pictures $19.95

star PRINTERS

PRINTER CABLES AND INTERFACES AVAILABLE
Call for current pricing

- 100 - 120 - 160 CPS
- Bidirectional Logic Seeking
- Friction and Tractor
- 9X9 Dot Matrix
- True Decenders
- High Res-Bit Image Block Graphics
- Super Script-Subscript
- Underlining
- Backspacing Doublestrike
- 5, 6, 8 1/2, 10, 12 and 17 Pitch
- Programmable Line Spacing
- SIX (6) MONTH WARRANTY

GEMINI 10X (9 Inch Carriage, 120cps) Friction and Tractor ..... $CALL
GEMINI 15X (15 Inch Carriage, 120cps) Friction and Tractor .... $CALL
DELTA 10 (10 Inch Carriage, 160cps) Friction and Tractor ...... $CALL
POWER TYPE Letter quality



NEW MODEL

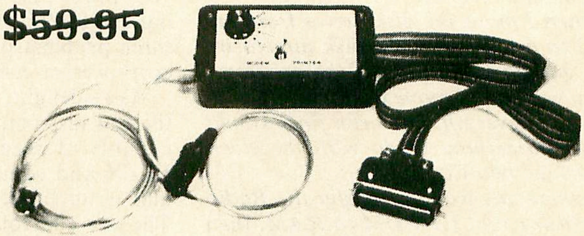
$239 **SG-10**

SP-3 INTERFACE for Color Computer

- 300-19,200 BAUD rates
- External to printer — No AC Plugs
- Built in modem/printer switch—no need for Y-cables or plugging/unplugging cables

Only:

~~$59.95~~



COMPLETE SYSTEM

~~**299.95**~~ NEW LOW PRICE

now with screen dump

Nothing more to buy!

Dealer inquiries invited

TRUE DATA PRODUCTS
195 Linwood Street, P.O. Box 546
Linwood, Massachusetts 01525

CALL US TODAY!! (617)234-7047
ORDER TOLL FREE 1-800-635-0300

The Two-Question Two-CoCo Problem

By Dan Downard
Rainbow Technical Editor

• *I have two questions. My system consists of a CoCo 2 64K, a CoCo 1 NC board upgraded to 64K with dual Radio Shack disk drives (white cases) and their controller, a CMP-130 printer, a Modem I and a Radio Shack cassette recorder.*

1) When I move the disk drives from my CoCo 2 to my CoCo 1, the disk directories display garbage and none of the programs will run, yet when I move the drives back to the CoCo 2 everything works fine. Could this have something to do with the clock speeds of the two CoCos?

2) Is there any way to transfer the Radio Shack Disk BASIC *1.1 ROM to RAM, then automatically print out all the memory locations to my printer? I have the Radio Shack* EDTASM+ *cartridge on disk using Roger Schrag's patch.*

Dean Pace
St. Peters, MO

Most of the people who write, Dean, have just the opposite problem with their disk drives. The older disk controllers will not work with the CoCo 2s due to the lack of 12 volts on the expansion port. As far as your problem is concerned, I suggest replacing the 6809E on your CoCo 1. I had the same problem once and replacing the microprocessor cured it.

As a sidelight, we have been informed that the new disk controllers from Tandy are not capable of reading single-density tracks. FLEX and some protection schemes read and write single-density data on Track 0. The new controllers will not work with this software.

To disassemble Disk BASIC all you need to do is return to the 32K mode by entering Z-BUG and changing memory location $FFDE. This disables the 64K mode and you should be able to read the data directly from ROM. Use the Z-BUG command THC000 DF58. Make sure you are in the Hex input mode first by typing `I16`.

A Hard Disk is Hard to Find

• *I have Version 02.00.00 of OS-9. It is compatible with either 15-megabyte or 35-megabyte hard disk drives. When I found out this information, I became interested in buying a hard disk drive. I searched through magazines and catalogs trying to find one and came up with nothing.*

Could you please give me any information as to where I could find a 15M or 35M hard disk drive?

Andy Ellinor
Odessa, FL

Andy, it just so happens that Tandy also sells 35-Meg hard drives. Maybe that's why the drivers are set up for these odd values. I'm sure that changing these parameters in the device descriptors will be addressed by one of our OS-9 advocates very shortly.

Mixing Software and Memory Expansion

• *I am considering installing more memory in my CoCo — 128K or 256K. There are several suppliers of these upgrades and I am concerned about their compatibility with software, that I believe, will eventually be available to use this memory. If I install one*

Dan Downard is an electrical engineer and has been involved in electronics for 26 years through ham radio (K4KWT). His interest in computers began about seven years ago and he has built several 68XX systems.

of these upgrades will I be able to use software written for this amount of memory or will I have to have a certain "brand" of memory expansion?

What do you know of the progress being made on this software, such as spreadsheets, word processors or database managers?

David Kincaid
Greenville, SC

David, you hit the crux of memory expansion when you bring up software. So far, I have seen no efforts in the fields you mention. Most memory upgrades come with RAM disk software. All this does is allow the increased memory to act as a super-fast disk drive.

Thunder RAM from Spectrum Projects comes with a built-in ROM using a system of machine language commands/entry points. It's called TDOS and it's a step in the right direction, but still does not easily facilitate the use of longer programs.

Personally, I can't envision a program too large to run on the CoCo if modular programming is used. Maybe the data will not fit in memory now; that is where a RAM disk helps. Just store all of your data in disk files that have fast access.

Terminal Adjustment for OS-9?

- *I have an older 'D' board that was "piggybacked" up to 32K. How do I go about installing 64K so it can be used as a terminal in my OS-9 system? I can remove the 74LS02 and 138 and install sockets if that is necessary.*

Bernie Besherse
Ketchikan, AK

I assume you want a smart terminal, Bernie, since 32K is more than enough for a dumb terminal; 32K is more than enough for a smart terminal, as long as you don't mind a small buffer. What I am getting at is the fact that your terminal program does not have to operate under OS-9 to use it as a remote terminal for OS-9. There are several excellent terminal packages written for Disk BASIC that will do the job.

To modify a 'D' board I suggest obtaining a copy of the May 1984 RAINBOW. There is an article entitled "RAM/ROM Upgrade Roundup" by Ed Ellers [Page 49] that gives instructions for upgrading several types of boards, up to the earlier CoCo 2s.

If you buy your 64K chips from one of our advertisers, they will usually provide installation instructions with your order if requested. Be sure to mention the type of board you have.

No Hope for this Marriage

- *Recently, I experimented with one of my programs. I made a BASIC program that requires the use of a predrawn graphics screen. Every time I work with this program, I first have to load the BASIC program and then* `LOADM` *the graphics screen. I want only one program to load! I tried to* `SAVEM` *the program and graphics screen like this:*

```
SAVEM"GRAPHS",1536,30000,1536
```

When I loaded the program, I made a listing perfectly, but when I ran the program, the computer stopped and the listing became lines of garbage. What can I do to `SAVEM` *and* `LOADM` *my BASIC program and graphics screen together?*

Eric Bernatchez
Quebec, Canada

Eric, loading a BASIC program also sets pointers in low RAM to tell CoCo where the program starts and stops. There are several methods of packing graphics into a BASIC program, but I would not advise them for extensive graphics usage. Just grin and bear it when you hear your drives purr.

The Secret of Cables and Pins

- *I have a gray CoCo with two vertical disk drives. I also have acquired two additional Drive 0s I would like to use as Drives 2 and 3.*

One of the best kept CoCo secrets seems to be the cable and pin function assignments and the disk drive addressing methods used by Radio Shack for the vertical drives. The local Radio Shack Service Center claims it cannot provide this information.

John NcNeirney
Madison, WI

John, the different drives are selected by a separate pin for each drive. The functions of all of the active pins between the controller and drives are as follows:

Pin	Signal
8	Index/sector
10	Drive select 1
12	Drive select 2
14	Drive select 3
16	Motor on
18	Direction select
20	Step
22	Write data
24	Write gate
26	Track 00
28	Write protect
30	Read data
32	Drive select 4

April Fresh CoCo

- *I read in another magazine that if you combine fabric softener and water in a spray bottle and spray it on the rug around your computer it will stop static electricity. Is this true or not?*

Chris Romance
Massapequa Park, NY

Chris, I heard a rumor to that effect, too, but I'm not a chemist. Maybe one of our readers can confirm this suggestion. It certainly works on your clothes!

Read My Memory

- *I upgraded to 64K, added disk and* Telewriter-64. *Everything worked. I then prefixed* ROMRAM *to a program expecting more memory from* `MEM`, *but CoCo seemed stuck in 32K. How can I determine the true memory remaining in 64K regime? Is there a* `POKE`*? Or am I misusing* ROMRAM*?*

R. Telford
Surrey, British Columbia

Mike, there have been several articles written on this subject, but you are correct — just simply running *ROMRAM* does not give more memory. It just relocates your BASIC ROMs to RAM where they can be changed, moved, etc. I do think you have a bigger buffer with *Telewriter-64* in 64K.

Prompt Printing

- *I have a Radio Shack DMP-100 printer and I print out graphics pictures quite often. But, even when I print them out at 1200 Baud, it still takes a while for a complete picture to print out. Is there any way I can print at a faster speed? I've heard of a serial-to-parallel interface, but what does it do?*

Matthew Coenen
Norwalk, IA

Matthew, the only thing a serial-to-parallel converter does is speed up the data from your CoCo to the printer; it does not allow the printer to print any faster. Instead of sending data at 1200 Baud, you are able to send it at 9600 Baud.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick DELPHI MAIL, then type `SEND` **and address TO: DANDOWNARD.**

BARDEN'S BUFFER

The Meaning of Life

By William Barden, Jr.
Rainbow Contributing Editor

The game I'm about to describe is more than a frivolous pastime. For some, it's a challenge in assembly language. For others, the key to unlocking the secrets of evolution. And for yet others, it's a way of generating interesting patterns. It's called "Life," and is an ancient computer game dating back at least 15 years.

Actually, it's not a game in the sense of a person versus computer confrontation. It's more a challenge of finding out how the game works and what the limits are, if any.

The Rules of Life

The rules were laid out by the game's inventor, mathematician John Horton Conway. Martin Gardner, of *Scientific American*'s "Mathematical Games" fame, introduced it in his October 1970 column and provided periodic updates for several years thereafter. For the most part, the descriptions I'm providing come from the *Scientific American* columns. There's a recently published book on "Life" and other topics, called *The Recursive Universe* (William Poundstone, William Morrow and Company, 1985) that makes interesting reading.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years experience in the industry covers a wide background: programming, systems analyzing and managing projects ranging from mainframes to microcomputers.

The rules are deceptively simple. Start with a square matrix like a checkerboard. Each square of the checkerboard is called a cell. The checkerboard can be any width and any height, although something on the order of a CoCo screen (128 by 96) is a good size to start with. Put a pattern on the checkerboard by generating random points or entering points via a BASIC `PSET` command. The pattern defined is the starting generation.

Now consider each cell in the 128 by 96 matrix defined by the CoCo's screen. If a cell is on, it's considered to be living. Whether or not a cell survives until the next generation is dependent on its immediate neighbors, the eight cells adjacent to the living cell, as shown in Figure 1. We'll call the neighbors A, B, C, D, F, G, H and I.

If the living cell has no neighbors or one neighbor, it dies from loneliness and disappears in the next generation. If the cell has two or three neighbors, it survives until the next generation. If the cell has more than three neighbors, it dies from overcrowding.

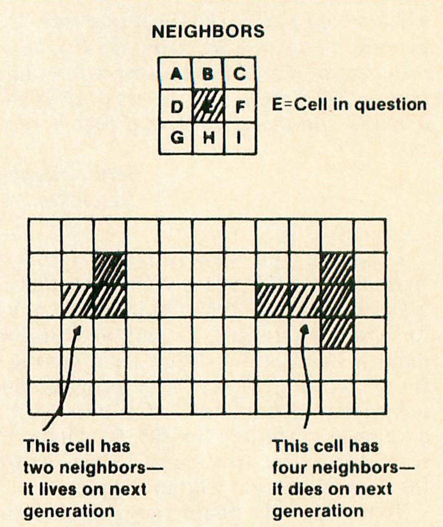

NEIGHBORS
A
B
C
D
E
F
G
H
I
E=Cell in question
This cell has two neighbors— it lives on next generation
This cell has four neighbors— it dies on next generation

Figure 1: Neighboring Cells

Not only can cells die, but new cells can be born. If an empty cell has three neighbors, the neighbors produce a new cell in the next generation. This only happens if an empty cell exists and there are three of the possible neighbors A, B, C, D, F, G, H and I.

Each generation is produced using these simple rules and there are an unlimited number of generations.

Here's an example. Start with a simple pattern such as the three cells in a straight line, as shown in Figure 2. The result in generation one is a straight line of three cells at right angles to the first line. This pattern flips back and forth, oscillating in a style reminiscent of a blinker. To "Life" devotees, the pattern is called a blinker.

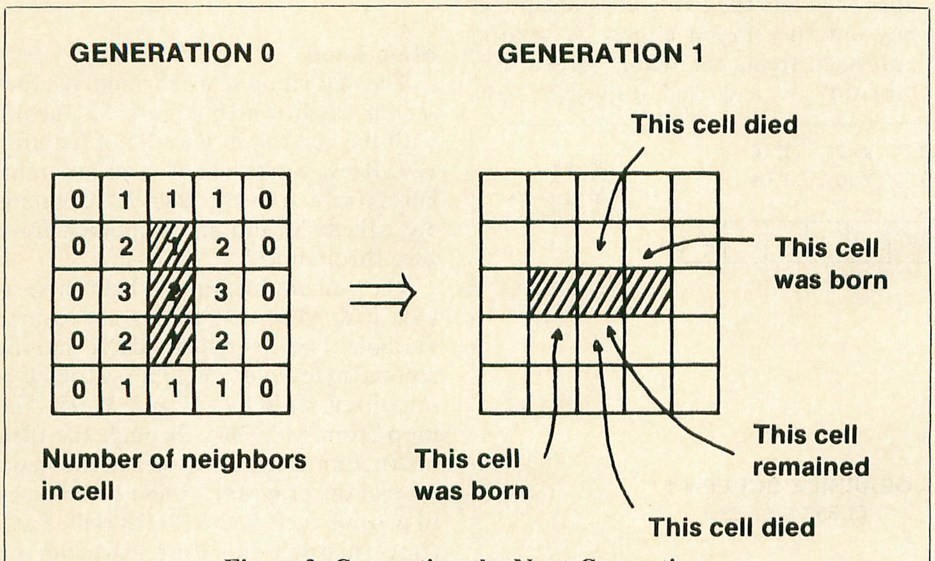


Figure 2: Computing the Next Generation

The Appeal of Life

The interesting thing about "Life" is the unpredictability of the patterns produced. Start with a completely random pattern generated by:

```
100 PMODE 4,1
110 SCREEN 1,0
120 FOR I=1 TO 1400
130 PSET(RND(256),RND(192))
140 NEXTI
```

and apply the rules of "Life." You'll wind up with a situation analogous to life oozing up out of the primordial slime — a random pattern that produces some organisms that stay around forever and others that produce beautiful designs but die off after a dozen generations or so. Figure 3 shows the tenth generation of a "Life" game generated from 1,400 initial random points, grouped towards the screen center.

The rules of "Life" pose some interesting questions and they had programmers, computer scientists and mathematicians spending millions of dollars of computer time investigating "Life's" patterns. Are there patterns that move? Are there patterns that reproduce without limit? The answer to both of these questions is yes, but it's not immediately obvious to those watching the game for the first time.

A High-Speed Life Generator

To study "Life," programmers and computer scientists use large mainframe computers and displays. One display allows 4,096 by 4,096 cells to be displayed at one time. As a matter of fact, a dedicated system has been built to run "Life" at high-speed so the patterns can be observed and cataloged. Bear in mind this is not a project that is a profound breakthrough in artificial intelligence — it is primarily a fun thing that has some interesting implications. Still, "Life" has a large following.

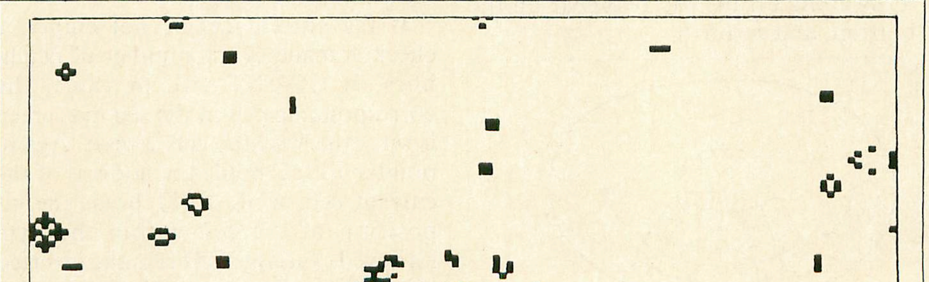


Figure 3: Sample of Life Generation

A BASIC Life

Listing 1 shows "Life" implemented in BASIC. This BASIC program uses only a 14 by 20 element portion of the screen since BASIC is decidedly slow in producing the next generation. To use this program, enter a number for 'X' from zero to 19 and a number for 'Y' from zero to 13 to define the pattern, and watch the computation. It takes about 52 seconds to produce the next generation. The blinker pattern is defined by entering:

10,6
10,7
10,8
-1,-1

The two "-1" values terminate the entry and start "Life" processing.

An Assembly Language Life

A 14 by 20 matrix is really not big enough to see the interaction of the different patterns. The point of this column is a full-blown CoCo assembly language program to generate a 128 by 96 single-color version of "Life" on the CoCo (see Listing 2). Using the assembly language program, each generation of "Life" takes about 6.7 seconds. Still slow, but fast enough so you can easily watch the progress from generation to generation. I decided to use the lower resolution `PMODE 0`, instead of the maximum resolution `PMODE 4`, which requires four times the computation because there are four times the number of pixels.

The Program Algorithm

Having been through several versions of "Life" on different systems, I knew the program could never be fast enough. For that reason, I gave a lot of thought as to how the program should be implemented.

The first design consideration was the graphics screen. The graphics screen in Disk BASIC starts at location $E00, as shown in Figure 4. If `PMODE 0` is used, the resolution of the screen is 128 pixels wide by 96 pixels high. In `PMODE 0` and in every single-color graphics mode, one bit is used to store the color for each pixel. A '1' in the bit means the foreground color is used; a '0' bit means the background color is used. Therefore, in `PMODE 0` there's a total of 128 pixels/row x 96 rows = 12,288 pixels = 12,288 bits.

Of course, there are eight bits in a byte, so 12,288 bits/(8 bits/byte) = 1,536 bytes used to store each graphics screen.

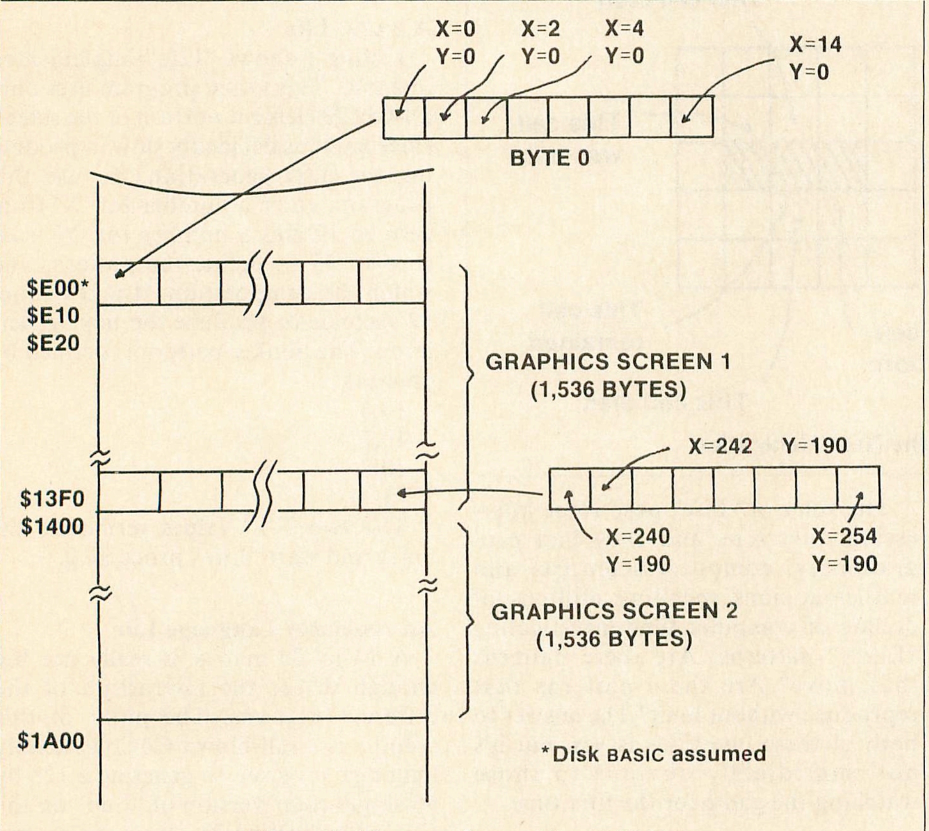


Figure 4: Memory Layout for `PMODE 0`

The plan I use is to keep the `PMODE 0,1` screen as the current screen and update a second screen, the `PMODE 0,2` screen. (In the `PMODE` command, the second parameter specifies the page number, in this case '1' or '2'.)

To do this, I have it scan the current screen one cell (pixel) at a time. For each cell, a count of the neighbors is made, with the corresponding cell in the new screen set or reset according to the rules of "Life." The scan proceeds from right to left across each row, starting at the last row and ending on the first row, as shown in Figure 5.

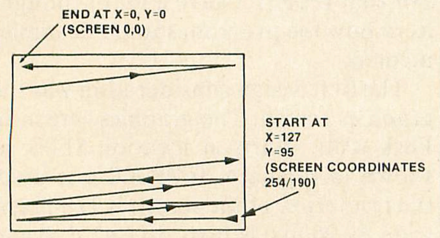


Figure 5: Scanning the Current Page

One other screen design consideration was what is to be done on the screen boundaries. There are two approaches to handling boundary conditions. One approach lets the living cells disappear beyond the screen edges. A second approach treats the whole screen as a "toroid" — a closed universe — as shown in Figure 6. The second approach is followed here. Patterns going off the right reappear on the left, patterns going off the top reappear on the bottom, and so forth.

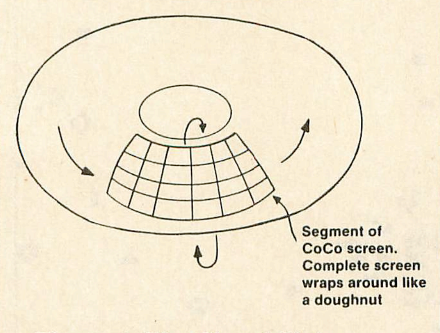


Figure 6: The Closed Universe of the Screen

After each screen scan of 12,288 cells, the second screen is written to the first screen by a quick assembly language subroutine. This makes the update appear almost immediately, avoiding a slow, partial screen update.

The program is divided into three parts: a main loop, a Count Neighbors subroutine and a Get Address subroutine.

Main Loop

The main loop scans through the first screen as shown in Figure 5, starting with the last cell in Row 95 of Column 127. Rows are called 'Y' and are numbered from zero through 95. Columns are called 'X' and are numbered from zero through 127.

The current location is held in variable XY. Note that this is a two-byte variable. The first byte holds 'X' and the second byte holds 'Y'. This variable is initialized with X=127 and Y=95. The loop from MAN005 through the fifth instruction after MAN080 is the main loop of the program, done 128*96 times to process each of the 12,288 cells. Each time through the loop, subroutine GETADD is called to calculate the addresses for the current XY. This is followed by a call to subroutine COUNTN to count the neighbors of the current cell.

After the call to COUNTN, a check is made of the current cell's on/off status. The byte location of the current cell is held in ELOC, a 16-bit pointer set by GETADD. The bit position of the cell within the byte is held by EBIT, an eight-bit variable set by GETADD. A branch is made to MAN040 if the cell is empty.

If the cell is empty, a check of variable COUNT (set by COUNTN) is made. If COUNT=three, the code at MAN010 is called for the "birth." If COUNT<> three, nothing is done.

If the current cell is not empty, a check is made of the number of neighbors. If COUNT=two or three, the corresponding cell in the second screen is set, otherwise the cell is reset. Again, pointer ELOC holds the address of the current cell, while EBIT holds the bit position of the cell within the byte retrieved. Variable EBITI is the inverted bit of the cell, set by GETADD. For example, if the current bit is represented by 0010000, EBITI holds 1101111. This makes it easy to reset the bit.

At the end of the birth/death checks, the code at MAN080 decrements 'X' by one. If 'X' does not equal 11111111 (off the left edge of the screen), the next cell is considered. If 'X' is 11111111, 127 is stored in the first byte of XY for the 'X' value, and 'Y' is decremented by one. If

'Y' is not equal to 1111111, the next row above is considered.

When the 'Y' value is decremented down to 1111111, the last row has been processed and the new cells are in the second screen. The data in screen two is moved to screen one by the short move code starting near MAN085. This code is so fast the entire screen appears to change, even though the movement is done from top to bottom, a row at a time.

Count Neighbors Subroutine

This subroutine counts the eight neighbors of the current cell. The result is COUNT, which holds a value of zero through eight and is used in the main loop to determine whether the cell lives or dies. The subroutine uses two tables. One of the tables starts at ALOC and is the byte location table. This table is established by the GETADD subroutine and holds the byte address of each of the neighbors of the current cell, the neighbors being the cell up and to the left, directly above, up and to the right, the cell directly left, and so forth.

The second table starts at ABIT and holds the bit configuration that defines the neighbor bit within the byte pointed to by the ALOC table. For example, if the current cell is defined by 00010000, the neighbor to the left is defined by 0010000 and the neighbor to the right by 00001000.

The Count Neighbors subroutine goes down through both tables, using the ALOC table entry to point to the byte containing the cell and the ABIT table entry to strip off the proper bit, which is counted if it is a one. The current cell is defined by ELOC and EBIT, and is beyond the end of both tables so that the subroutine only counts neighbors.

Get Address Subroutine

Most of the work in the program is done by the Get Address subroutine. It establishes the addresses in the ALOC table and the bit positions in the ABIT table. The graphics data for all 128 by 96 bits, remember, is represented by one bit somewhere within the 1,536 bytes of screen one. The first byte represents Y=0 and X's of 0, 1, 2, 3, 4, 5, 6 and 7; the next byte represents Y=0 and X's of 8, 9, 10, 11, 12, 13, 14 and 15, and so on.

The subroutine locates the byte containing the current X,Y by multiplying the 'Y' value by 16, as there are 16 bytes per row. The 'X' value is then divided by eight and added to the Y*16 value. Eight is used as a divisor because there are eight cells per byte. The division is done by three consecutive shifts — it's equivalent to a BASIC `INT` function. The actual address in screen one is then computed by adding $E00 to Y*16+INT(X/8). This byte address is stored in DLOC, ELOC and FLOC the table locations for the current X,Y and its two neighbors on the same row.

The ALOC, BLOC, and CLOC locations in the preceding row can be found by subtracting 16 from the locations for the current row. The result is put into the three table entries. Similarly, the GLOC, HLOC and ILOC locations are found by adding 16 to the current row locations.

These table entries are valid providing one of the three rows isn't off the top or bottom (or another condition, which we'll discuss shortly). Checks are made for this, and 1,536 is either added or subtracted from the row to point to the wrap-around row from the other side of the screen, which gives the toroidal effect.

The code from location GET022 is used to compute and store the bit position within the byte to be accessed by the ALOC entry. This location is determined by the three least significant bytes of 'X'. If X=XXXXX000, for example, the bit position is 10000000; if X=XXXXX001, the bit position is 01000000, and so forth, up to X=XXXXX111, where the bit position is 00000001.

The cell mask values are contained within a cell mask table at location MASK. The entries in ABIT are initialized such that the current 'Y' values (B, E and H) get the mask table value, the 'Y' locations to the left get the bit position values with the bit shifted left one bit, and the Y locations to the right get the bit position values with the bit shifted right one bit. If the bit position for the current cell is 00010000, for example, ABIT, DBIT and GBIT get 00100000, and CBIT, FBIT and IBIT get 00001000.

The last part of the GETADD subroutine adjusts the ALOC table for the boundary conditions in cases where either the current 'Y' involves two bytes or the edge of the screen (left or right) has been encountered. If the current 'Y' is at the left bit of a byte, for example, the bit mask is 10000000. The left neighbor's bit mask is 00000001 in this case (the right neighbor's bit mask is 01000000).

This means the left neighbor's byte location should be one less than the location stored. This check is made and the byte location adjusted in the two cases where the current 'Y' is at either end of the byte. A check is also made for the left and right edges, and 15 is added or subtracted to get the proper wrap-around byte in this case.

To avoid computing addresses for every X,Y, the byte address calculation is done only for X's that represent a bit at either the left or right end of the byte. These are the only cases where two bytes are involved. If the bit is in bit position one (01000000) through five (00000101), the prior ALOC addresses apply, and the address portion of GETADD is skipped at the beginning of the subroutine. The effect is to speed up the subroutine for two-thirds of the cells, knocking about 14 percent off the screen update rate.

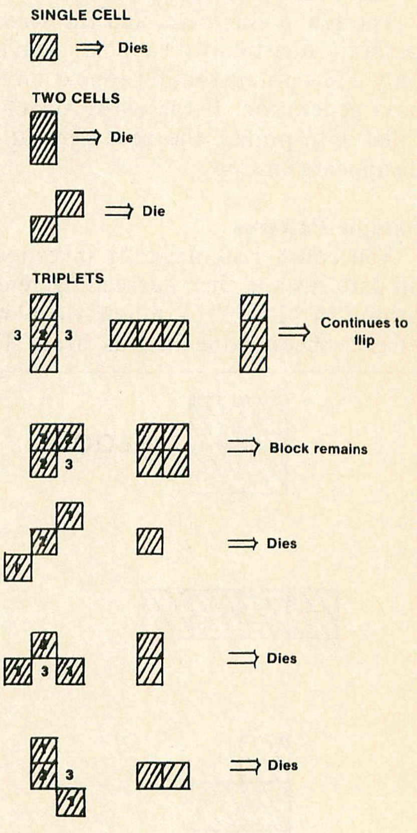


Figure 7: One-, Two- and Three-Cell Patterns

A BASIC Driver

Listing 3 shows the BASIC driver program that implements the assembly language "Life" program. It has the assembly language machine language code embedded in it as a series of `DATA` values. The `DATA` values are relocated to the &H3E00 area by a `POKE` loop before the program is executed.

The BASIC driver has provision for either entering a set of points for the initial "Life" pattern, or for generating a number of random points at the screen center. To enter a set of points, enter 'S' after the USER PNTS (S) OR RANDOM (R)? prompt message.

The program then asks for the X,Y position of the point: X,Y? Enter as many X,Y values as you want, and enter `-1,-1` to terminate the entry. The X,Y points *must* be even numbers due to the half resolution of `PMODE 0`. For example, adjacent points are 100/100, 100/102 and 100/104.

To use a set of random points, enter `R` after the Set/Random message. The program asks for the number of points to use: NUMBER OF POINTS?

Too few points here, and the second generation virtually disappears, leaving only a few points that disappear on the next generation. If the entire screen is filled with points, the next generation disappears entirely.

Sample Patterns

You could systematically investigate all patterns and their succeeding generations in "Life," — much work has already been done in this area. The simplest pattern is a single cell (Figure 7), which dies in the next generation from loneliness. The next simplest patterns are two adjacent cells, either horizontally, vertically or diagonally. These also die in the next generation.

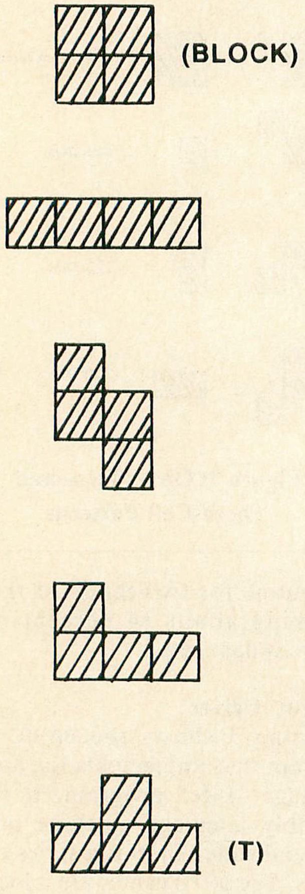


Figure 8: The Five Tetrominoes

The next set of patterns are triplets. There are five ways in which three cells can be combined, as shown in Figure 7. Since the L-shape cells have two neighbors, they endure until the next generation. In addition, the cell in the nook of the 'L' is born. The resulting block is a stable life form — what Conway calls a still life — it never changes. We've seen the three cells in a straight line before; they change to a line at right angles on the next generation, a so-called blinker. The blinker flips back and forth from generation to generation. The other configurations die after one generation.

The next set of cells are made of four cells connected together. The game's jargon for these patterns is "tetromino," tetra meaning four. There are five ways that four cells can be connected, as shown in Figure 8. The block configuration is stable, as we've seen. The 'T' tetromino looks as if it will grow larger and larger, but stabilizes after nine generations into a "traffic light," a series of four blinkers.

The straight line tetromino turns into a block of six cells on the next generation, which in turn creates a "beehive," another unchanging pattern. The two remaining tetrominoes also produce beehives.

So far, "Life" isn't too exciting, but we've only considered four sets of patterns. There is an infinite number to go!

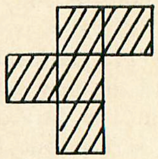


Figure 9: The R Pentomino

The next set of patterns is formed by connecting five cells, "pentomino" shapes. One of the most interesting of these is the 'R' pentomino, shown in Figure 9. The 'R' pentomino seems to grow without bound, scattering debris all over the screen. However, after dozens of generations in our toroidal universe, the life forms settle down to simple patterns that are either still life or blinkers. An intermediate screen is shown in Figure 10.

Ah, Sweet Mystery of Life

Is there any configuration of cells that grows without bound, forever? Experimentation in this area produces a shape known as a glider. It glides across the screen (Figure 11). The glider can be generated by a glider gun, a complex arrangement of patterns that goes on producing gliders forever. (It's also seen in the 'R' pentomino patterns.) There are other patterns that replicate themselves as well.

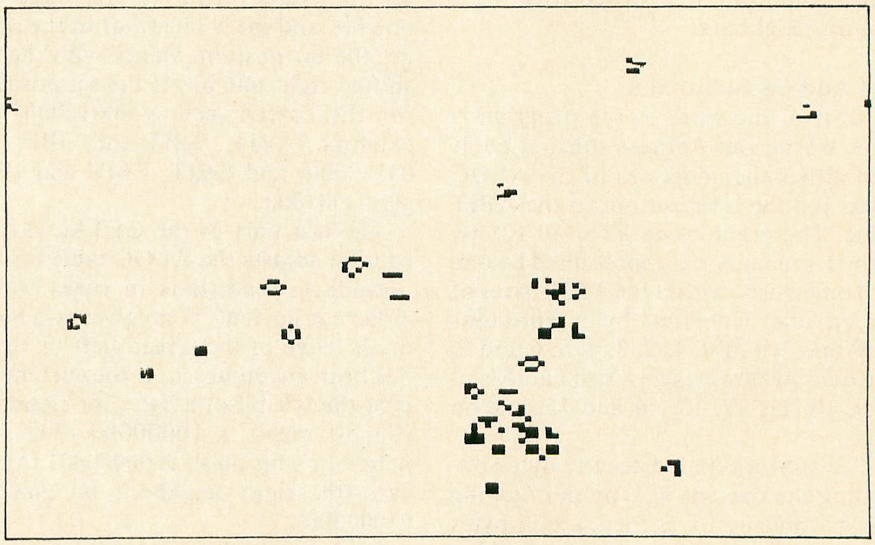


Figure 10: R Pentomino Patterns

It's a lot of fun to start with a pattern of your own design (you can do this by slightly altering the BASIC program) and watch what happens. At the very least, you'll see generations of interesting "Life" forms.

For more reading on this, get Poundstone's book or try to get the original *Scientific American* articles. For help, contact me at P.O. Box 3568, Mission Viejo, CA 92692.

Next month I'll be back with more assembly language topics. In the meantime, keep assembling! ☐

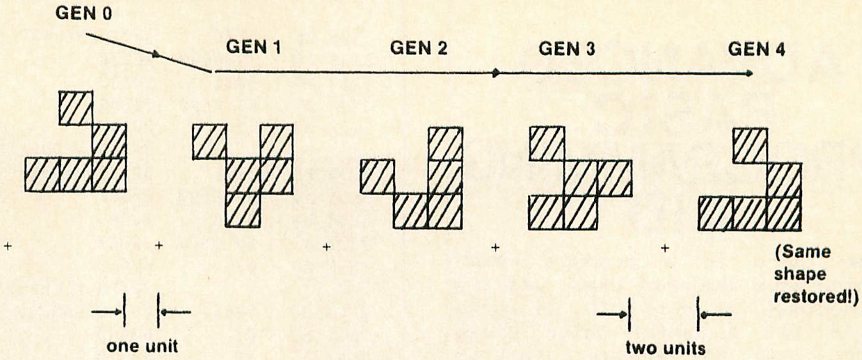


Figure 11: Glider Action

Listing 1: SLOWLIFE

```
100 'RUDIMENTARY LIFE 20 X 14
110 DIM A(13,19)
120 'CLEAR ARRAY
130 FOR Y=0 TO 13:FOR X=0 TO 19
140 A(Y,X)=32
150 NEXT X: NEXT Y
160 CLS
170 'READ IN INITIAL VALUES
180 PRINT@448,"";
190 INPUT "X,Y:";X,Y
200 IF X=-1 THEN 240 ELSE PRINT
    @Y*32+X,"O";: A(Y,X)=79
210 PRINT@452,"          ";
220 GOTO 180
230 'MAIN LOOP
240 FOR Y=0 TO 13: FOR X=0 TO 19
250 XL=X-1: IF XL=-1 THEN XL=19
260 XP=X+1: IF XP=20 THEN XP=0
270 YL=Y-1: IF YL=-1 THEN YL=13
280 YP=Y+1: IF YP=14 THEN YP=0
290 'FIND # OF NEIGHBORS
300 NO=0
310 IF PEEK(&H400+YL*32+XL)<>96
    THEN NO=NO+1
320 IF PEEK(&H400+YL*32+X)<>96
    THEN NO=NO+1
330 IF PEEK(&H400+YL*32+XP)<>96
    THEN NO=NO+1
340 IF PEEK(&H400+Y*32+XL)<>96
    THEN NO=NO+1
350 IF PEEK(&H400+Y*32+XP)<>96
    THEN NO=NO+1
360 IF PEEK(&H400+YP*32+XL)<>96
    THEN NO=NO+1
370 IF PEEK(&H400+YP*32+X)<>96
    THEN NO=NO+1
380 IF PEEK(&H400+YP*32+XP)<>96
    THEN NO=NO+1
390 IF PEEK(&H400+Y*32+X)<>96
    THEN IF NO=2 OR NO=3
    THEN A(Y,X)=79 ELSE A(Y,X)=
    32: GOTO 410
400 IF NO=3 THEN A(Y,X)=79
410 NEXT X: NEXT Y
420 'PRINT NEXT GENERATION
430 FOR Y=0 TO 13: FOR X=0 TO 19
440 PRINT@Y*32+X,CHR$(A(Y,X));
450 NEXT X: NEXT Y
460 GOTO 240
```

Listing 2: FASTLIFE

```
                     00100 **********************************************
                     00110 * HIGH-SPEED LIFE IN 128 BY 96 PIXELS        *
                     00120 **********************************************
                     00130 *
                     00140 * MAIN LOOP
                     00150 *
3E00                 00160         ORG     $3E00
3E00 CC    7F5F      00170         LDD     #127*256+95
3E03 FD    3F83      00180         STD     XY        INITIALIZE X,Y
3E06 FC    3F83      00190 MAN005  LDD     XY          GET X,Y
3E09 17    0073      00200         LBSR    GETADD      FIND ALL ADDRESSES
3E0C 8D    59        00210         BSR     COUNTN      COUNT NEIGHBORS
3E0E A6    9F 3F76   00220         LDA     [ELOC]      GET BYTE
3E12 B4    3F80      00230         ANDA    EBIT        GET CELL
3E15 27    29        00240         BEQ     MAN040      GO IF EMPTY
                     00250 * LIVING CELL HERE
3E17 B6    3F82      00260         LDA     COUNT       GET COUNT
3E1A 84    0E        00270         ANDA    #$0E        THIS TRICK
3E1C 88    02        00280         EORA    #2            TESTS FOR 2 OR 3
3E1E 27    10        00290         BEQ     MAN010      GO IF 2 OR 3
                     00300 * ON AND NOT 2 OR 3
```

ADVANCED BASIC PROGRAMMING AID

Now there is a product which integrates the most used utility functions for your COCO. It works with all Extended Color Basic COCOs, 16k, 32k and 64k. Look at the features available, no need for a text processor to create or change programs. Saves disk space and time because programs do not have to be saved in ASCII format.

* COPY COMMAND: Copy one or more statements in a program
* MOVE COMMAND: Move one or more statements in a program
* FIND COMMAND: Find a string and REPEAT FIND for string.
* MULTIPLE EDITING SESSIONS: You can edit two programs at once and MERGE all or part. This also allows you to RUN one pgm while editing another
* SCROLLING: Allows for down or up scrolling through pgm.
* AUTOMATIC EDIT: You can enter edit of current line without specifying the line number.
* COMMAND KEYS: One keystroke enters most basic commands.
* REPEATING KEYS: Auto repeat.
* AUTOMATIC LINE NUMBERING: Set start and increment.
* BASIC FORMATTING: ON/OFF control, for easier reading of list/print multiple stmts
* KEYBOARD CLICKER: ON/OFF
* CLEAR KEY DISABLE: ON/OFF
* AUTOMATIC MENU LOADER:If you have a favorite menu pgm you can load it automatically.
* AUTOMATIC PROGRAM EXIT: Run another ML pgm w/no pwr off.

ALSO SUPER PROGRAMMING AID: You get Advanced Programming Aid plus
* PROGRAMMABLE COMMAND KEYS: You get a command editing Program to make the keys do what you want, enter up to 250 characters with one key.

ADVANCED PROGRAMMING AID $24.95
SUPER PROGRAMMING AID $29.95
Upgrade from ADV to SUPER $14.95

ALSO: GO-THELLO - a popular board game, 1 or 2 players, 3 levels of difficulty on 1 player. $12.95

BSS DISK MANAGER:copy, move, kill run, rename etc. handy for disk management make it simple: $14.95

$2.00 S & H specify DISK or TAPE

Bangert Software Systems
P. O. BOX 21056
Indianapolis, IN 46221

```
3E20 BE   3F76      00310 MAN007  LDX   ELOC      POINT TO BYTE
3E23 A6   89 0600   00320         LDA   1536,X    GET BYTE FROM NEXT
3E27 B4   3F81      00330         ANDA  EBITI     RESET BIT - DEATH!
3E2A A7   89 0600   00340         STA   1536,X    STORE BYTE
3E2E 20   17        00350         BRA   MAN080    GO FOR NEXT CELL
                    00360 * ON AND 2 OR 3
3E30 BE   3F76      00370 MAN010  LDX   ELOC      POINT TO BYTE
3E33 A6   89 0600   00380         LDA   1536,X    GET BYTE
3E37 BA   3F80      00390         ORA   EBIT      BIRTH OR STAY ALIVE
3E3A A7   89 0600   00400         STA   1536,X    STORE BYTE
3E3E 20   07        00410         BRA   MAN080    GO TO NEXT GEN
                    00420 * EMPTY HERE
3E40 B6   3F82      00430 MAN040  LDA   COUNT     GET COUNT
3E43 81   03        00440         CMPA  #3        TAKES 3 TO TANGO
3E45 27   E9        00450         BEQ   MAN010    GO IF BIRTH!
                    00460 * PREPARE FOR NEXT CELL
3E47 7A   3F83      00470 MAN080  DEC   XY        DECREMENT X
3E4A 2A   BA        00480         BPL   MAN005    GO IF $00 - $7F
3E4C 86   7F        00490         LDA   #127      RESET X
3E4E B7   3F83      00500         STA   XY        STORE IN X
3E51 7A   3F84      00510         DEC   XY+1      DECREMENT Y
3E54 2A   B0        00520         BPL   MAN005    GO IF $00 - $60
3E56 8E   0E00      00530         LDX   #$E00   POINT TO PAGE 1
3E59 108E 1400      00540         LDY   #$E00+1536  POINT TO PAGE 2
3E5D EC   A1        00550 MAN085  LDD   ,Y++      GET WORD
3E5F ED   81        00560         STD   ,X++      STORE IN PAGE 1
3E61 8C   1400      00570         CMPX  #$E00+1536  AT END?
3E64 26   F7        00580         BNE   MAN085    GO OF NO
3E66 39             00590         RTS           RETURN TO BASIC
                    00600 ***********************************************
                    00610 * COUNT NEIGHBORS SUBROUTINE                  *
                    00620 ***********************************************
3E67 5F             00630 COUNTN  CLRB          SET COUNT TO 0
3E68 8E   3F66      00640         LDX   #ALOC   POINT TO TABLE START
3E6B 108E 3F78      00650         LDY   #ABIT   POINT TO TABLE START-1
3E6F A6   91        00660 CNT005  LDA   [,X++]    GET BYTE WITH CELL
3E71 A4   A0        00690         ANDA  ,Y+       TEST BIT
3E73 27   01        00700         BEQ   CNT010    GO IF NO CELL
3E75 5C             00710         INCB            BUMP COUNT
3E76 8C   3F76      00720 CNT010  CMPX  #ILOC+2   AT END OF TABLES?
3E79 26   F4        00730         BNE   CNT005    GO IF NO
3E7B F7   3F82      00740         STB   COUNT   STORE COUNT
3E7E 39             00750         RTS           RETURN
                    00760 ***********************************************
                    00770 * GET ADDRESS SUBROUTINE. GETS NINE ADDRESSES*
                    00780 ***********************************************
3E7F 34   02        00790 GETADD  PSHS  A       SAVE X
3E81 84   07        00800         ANDA  #7      TEST BITS
3E83 27   06        00810         BEQ   GET015  GO IF 000
3E85 84   06        00820         ANDA  #6      IGNORE LSB
3E87 88   06        00830         EORA  #6      TEST FOR 110 OR 111
3E89 26   44        00840         BNE   GET022  BYPASS LOC COMP IF 001-101
3E8B 86   10        00850 GET015  LDA   #16     16 BYTES PER ROW
3E8D 3D             00860         MUL           16*Y
3E8E 1F   01        00870         TFR   D,X     FOR NEXT ADD
3E90 E6   E4        00880         LDB   ,S      GET X
3E92 54             00890         LSRB          X/2
3E93 54             00900         LSRB          X/4
3E94 54             00910         LSRB          X/8
3E95 3A             00920         ABX           16*Y+INT(X/8)=DISP
3E96 30   89 0E00   00930         LEAX  $E00,X  $E00+16*Y+INT(X/8)
3E9A BF   3F6C      00940         STX   DLOC    CURRENT ROW
3E9D BF   3F76      00950         STX   ELOC
3EA0 BF   3F6E      00960         STX   FLOC
3EA3 1F   10        00970         TFR   X,D     FOR COMPUTATIONS
3EA5 83   0010      00980         SUBD  #16     FOR PREV ROW - MAY BE MODS
3EA8 1083 0E00      00990         CMPD  #$E00   ABOVE TOP?
3EAC 24   03        01000         BHS   GET011  GO IF NO
3EAE C3   0600      01010         ADDD  #1536   WRAP AROUND FROM BOTTOM
3EB1 FD   3F66      01020 GET011  STD   ALOC    PREVIOUS ROW
3EB4 FD   3F68      01030         STD   BLOC
3EB7 FD   3F6A      01040         STD   CLOC
3EBA C3   0020      01050         ADDD  #32     FOR NEXT ROW
3EBD 1083 13FF      01060         CMPD  #$E00+1535
3EC1 23   03        01070         BLS   GET020  GO IF NOT OFF BOTTOM
3EC3 83   0600      01080         SUBD  #1536   WRAP AROUND FROM TOP
3EC6 FD   3F70      01090 GET020  STD   GLOC    NEXT ROW
3EC9 FD   3F72      01100         STD   HLOC
3ECC FD   3F74      01110         STD   ILOC
3ECF 35   04        01120 GET022  PULS  B       GET X
3ED1 C4   07        01130         ANDB  #7      0-7
```

```
3ED3 8E    3F5D     01140          LDX     #MASK    MASK TABLE ADDR
3ED6 3A             01150          ABX              POINT TO MASK
3ED7 A6    84       01160          LDA     ,X       GET MASK
3ED9 B7    3F79     01170          STA     BBIT     CURRENT COLUMN
3EDC B7    3F80     01180          STA     EBIT
3EDF B7    3F7E     01190          STA     HBIT
3EE2 43             01200          COMA             GET INVERTED BITS
3EE3 B7    3F81     01210          STA     EBITI    SAVE FOR RESET BIT
3EE6 A6    1F       01220          LDA     -1,X     GET LEFT MASK
3EE8 B7    3F78     01230          STA     ABIT     PREVIOUS COLUMN
3EEB B7    3F7B     01240          STA     DBIT
3EEE B7    3F7D     01250          STA     GBIT
3EF1 A6    01       01260          LDA     +1,X     GET RIGHT MASK
3EF3 B7    3F7A     01270          STA     CBIT     NEXT COLUMN
3EF6 B7    3F7C     01280          STA     FBIT
3EF9 B7    3F7F     01290          STA     IBIT
                    01300 * POSSIBLE ADJUST OF LOC'NS ON BOUNDARIES
3EFC B6    3F78     01310          LDA     ABIT     GET LEFT MASK
3EFF 81    01       01320          CMPA    #1       IS IT LSB?
3F01 26    29       01330          BNE     GET030   GO IF NO
                    01340 * TWO-BYTE CASE HERE
3F03 8E    0000     01350          LDX     #0       FINAGLE FACTOR
3F06 F6    3F67     01360          LDB     ALOC+1   GET BYTE LOC'N LSB
3F09 C4    0F       01370          ANDB    #$F      16-BYTE BOUND
3F0B 26    03       01380          BNE     GET025   GO IF NOT OFF LEFT
3F0D 30    88 10    01390          LEAX    +16,X    OFF EDGE
3F10 30    1F       01400 GET025   LEAX    -1,X     ADJUST IN EITHER CASE
3F12 34    10       01410          PSHS    X        STORE FOR COMPUTATION
3F14 FC    3F66     01420          LDD     ALOC     ADJUST LEFT LOC'NS
3F17 E3    E4       01430          ADDD    ,S
3F19 FD    3F66     01440          STD     ALOC
3F1C FC    3F6C     01450          LDD     DLOC
3F1F E3    E4       01460          ADDD    ,S
3F21 FD    3F6C     01470          STD     DLOC
3F24 FC    3F70     01480          LDD     GLOC
3F27 E3    E1       01490          ADDD    ,S++
3F29 FD    3F70     01500          STD     GLOC
3F2C B6    3F7A     01510 GET030   LDA     CBIT     GET RIGHT MASK
3F2F 2A    2A       01520          BPL     GET040   GO IF NOT $80 CASE
                    01530 * TWO-BYTE CASE HERE
3F31 8E    0000     01540          LDX     #0       FINAGLE FACTOR
3F34 F6    3F6B     01550          LDB     CLOC+1   GET BYTE LOC'N LSB
3F37 C4    0F       01560          ANDB    #$F      16-BYTE BOUNDARY
3F39 C1    0F       01570          CMPB    #$F      TEST FOR OFF RIGHT
3F3B 26    02       01580          BNE     GET035   GO IF NOT OFF
3F3D 30    10       01590          LEAX    -16,X    OFF EDGE
3F3F 30    01       01600 GET035   LEAX    +1,X     ADJUST IN EITHER CASE
3F41 34    10       01610          PSHS    X        STORE FOR CALCULATIONS
3F43 FC    3F6A     01620          LDD     CLOC     ADJUST RIGHT EDGE LOC'NS
3F46 E3    E4       01630          ADDD    ,S
3F48 FD    3F6A     01640          STD     CLOC
3F4B FC    3F6E     01650          LDD     FLOC
3F4E E3    E4       01660          ADDD    ,S
3F50 FD    3F6E     01670          STD     FLOC
3F53 FC    3F74     01680          LDD     ILOC
3F56 E3    E1       01690          ADDD    ,S++
3F58 FD    3F74     01700          STD     ILOC
3F5B 39             01710 GET040   RTS              RETURN
                    01720 * CELL MASK TABLE
3F5C       01       01730          FCB     1
3F5D       80       01740 MASK     FCB     128
3F5E       40       01750          FCB     64
3F5F       20       01760          FCB     32
3F60       10       01770          FCB     16
3F61       08       01780          FCB     8
3F62       04       01790          FCB     4
3F63       02       01800          FCB     2
3F64       01       01810          FCB     1
3F65       80       01820          FCB     128
                    01830 * BYTE LOCATION TABLE
                    01840 *          A*B*C
                    01850 *          D*E*F
                    01860 *          G*H*I
3F66       0000     01870 ALOC     FDB     0
3F68       0000     01880 BLOC     FDB     0
3F6A       0000     01890 CLOC     FDB     0
3F6C       0000     01900 DLOC     FDB     0
3F6E       0000     01910 FLOC     FDB     0
3F70       0000     01920 GLOC     FDB     0
3F72       0000     01930 HLOC     FDB     0
3F74       0000     01940 ILOC     FDB     0
```

* LOCAL * IN * LOS * ANGELES *

THE E.D.C. FLIPPY ATTACK!

DON'T RUIN YOUR DISKS!
Highest Quality Certified Diskettes. True Flippies—Already "Doubled". DS/DD 10/$17.95 + $2.50 S & H

2764 Eprom (10)	$4.50 ea.
27128 Eprom (10)	$5.50 ea.
6809E CPU	$17.95
6847 VOG	$17.95
6883 SAM	$24.95
LS785 NEW SAM	$29.95
RS DOS 1.1	$22.95
Ext. Bas. 1.1	$24.95
Est. Bas (28 Pin)	$29.95
4464 DRAM (2 chips)	$34.95
4164 DRAM (8 chips)	$19.95
Model 100 8K Upgrade	$34.95
Gold Rom "Y" Cable	$22.95

Quadrature Fan Module B
Piezo Electric — .11 Watts
Fits IN Coco — No Surge
5 CFM — Low Noise — UL
$29.95 + 2.50 S & H

E.D.C. carries the most complete line of software and hardware in the market.

232 RemotePlus by David Cherin
- *Requires RS232 Pak or PBJ 2SP*
- *Remote Terminal Program*
- *Parallel to Keyboard*
- *No Lost or Garbled Data*
- *Error Trapping* ✓ *Software Clock*
- *Disable Break Key* ✓ *Inkey$ Support*
- *New Terminal Program*
- *Conversation Mode*
- *All Ext. & Disk Commands*
- *20 Commands Added*
- *Perfect for BBS*
- *4 Versions Incl: Ext., 1.0,1.1 & JDOS*
- *Much More - Uses 4K*

RAINBOW CERTIFICATION SEAL

$24.95 + 2.50 S & H (CA. res + tax)

VIP Writer/Speller is so good, it doesn't need the ads............**$59.95**

Always $2.50 S & H = 1 lb. Can = Call

COLOR & MICRO COMPUTERS
Software ● Hardware ● Support
Educational ● Small Business ● Games
VOICE (213) 254-6809 10 A.M.-10 P.M.
BBS (213) 258-0640 24 HRS.
300 and 1200 Baud
Extended Hours+Call before coming.
6130 YORK BOULEVARD
POST OFFICE BOX 42718
LOS ANGELES, CA. 90042
MAKE CHECKS PAYABLE TO E.D.C.

```
3F76      0000      01950 ELOC    FDB    0
                    01960 * MASK TABLE FOR NEIGHBORS
3F78      00        01970 ABIT    FCB    0
3F79      00        01980 BBIT    FCB    0
3F7A      00        01990 CBIT    FCB    0
3F7B      00        02000 DBIT    FCB    0
3F7C      00        02010 FBIT    FCB    0
3F7D      00        02020 GBIT    FCB    0
3F7E      00        02030 HBIT    FCB    0
3F7F      00        02040 IBIT    FCB    0
3F80      00        02050 EBIT    FCB    0
3F81      00        02060 EBITI   FCB    0        INVERTED BITS
                    02070 * WORKING VARIABLES
3F82      00        02080 COUNT   FCB    0        COUNT OF NEIGHBORS
3F83      0000      02090 XY      FDB    0        CURRENT X,Y
          0000      02100         END

00000 TOTAL ERRORS
```

350	107
650	190
800	158
1050	188
1250	99
END	46

Listing 3: DRIVER

```
100 ' HIGH-SPEED LIFE BASIC DVR
110 CLEAR 200,&H3DFF
120 FOR I=&H3E00 TO &H3F65
130 READ A: POKE I,A
140 NEXT I
150 DEFUSR = &H3E00
160 DIM PT(400)
170 CLS
180 PRINT @15,"LIFE"
190 INPUT "USER PNTS (S) OR
    RANDOM (R)";A$
200 IF A$="S" THEN 270
210 INPUT "NUMBER OF POINTS";NP
220 FOR I=1 TO NP
230 PT(I)=(100+RND(56))*256+85+
    RND(36)
240 NEXT I
250 I=I-1
260 GOTO 360
270 I=0
280 PRINT"ENTER X,Y(-1=END)"
290 PRINT@448,"X,Y";
300 INPUT X,Y
310 IF X=-1 THEN 360
320 PT(I+1)=X*256+Y
330 I=I+1
340 PRINT@448,"                  ";
350 GOTO 290
360 FOR J=1 TO 2
370 PMODE 0,J
380 PCLS
390 NEXT J
400 PMODE 0,1
410 SCREEN 1,0
420 FOR J=1 TO I
430 PSET(INT(PT(J)/256),PT(J)-
    INT(PT(J)/256)*256)
440 NEXT J
450 GN=1
460 A=USR0(0)
470 GN=GN+1
480 GOTO 460
490 DATA &HCC,&H75,&H5F,&HFD
500 DATA &H3F,&H83,&HFC,&H3F
510 DATA &H83,&H17,&H00,&H73
520 DATA &H8D,&H59,&HA6,&H9F
530 DATA &H3F,&H76
540 DATA &HB4,&H3F,&H80,&H27
550 DATA &H29,&HB6,&H3F,&H82
560 DATA &H84,&H0E,&H88,&H02
570 DATA &H27,&H10,&HBE,&H3F
580 DATA &H76,&HA6,&H89,&H06
590 DATA &H00,&HB4,&H3F,&H81
600 DATA &HA7,&H89,&H06,&H00
610 DATA &H20,&H17,&HBE,&H3F
620 DATA &H76,&HA6,&H89,&H06
630 DATA &H00,&HBA,&H3F,&H80
640 DATA &HA7,&H89,&H06,&H00
650 DATA &H20,&H07,&HB6,&H3F
660 DATA &H82,&H81,&H03,&H27
670 DATA &HE9,&H7A,&H3F,&H83
680 DATA &H2A,&HBA,&H86,&H7F
690 DATA &HB7,&H3F,&H83,&H7A
700 DATA &H3F,&H84,&H2A,&HB0
710 DATA &H8E,&H0E,&H00,&H10
720 DATA &H8E,&H14,&H00,&HEC
730 DATA &HA1,&HED,&H81,&H8C
740 DATA &H14,&H00,&H26,&HF7
750 DATA &H39,&H5F,&H8E,&H3F
760 DATA &H66,&H10,&H8E,&H3F
770 DATA &H78,&HA6,&H91,&HA4
780 DATA &HA0,&H27,&H01,&H5C
790 DATA &H8C,&H3F,&H76,&H26
800 DATA &HF4,&HF7,&H3F,&H82
810 DATA &H39,&H34,&H02,&H84
820 DATA &H07,&H27,&H06,&H84
```

```
830 DATA &H06,&H88,&H06,&H26
840 DATA &H44,&H86,&H10,&H3D
850 DATA &H1F,&H01,&HE6,&HE4
860 DATA &H54,&H54,&H54,&H3A
870 DATA &H30,&H89,&H0E,&H00
880 DATA &HBF,&H3F,&H6C,&HBF
890 DATA &H3F,&H76,&HBF,&H3F
900 DATA &H6E,&H1F,&H10,&H83
910 DATA &H00,&H10,&H10,&H83
920 DATA &H0E,&H00,&H24,&H03
930 DATA &HC3,&H06,&H00,&HFD
940 DATA &H3F,&H66,&HFD,&H3F
950 DATA &H68,&HFD,&H3F,&H6A
960 DATA &HC3,&H00,&H20,&H10
970 DATA &H83,&H13,&HFF,&H23
980 DATA &H03,&H83,&H06,&H00
990 DATA &HFD,&H3F,&H70,&HFD
1000 DATA &H3F,&H72,&HFD,&H3F
1010 DATA &H74,&H35,&H04,&HC4
1020 DATA &H07,&H8E,&H3F,&H5D
1030 DATA &H3A,&HA6,&H84,&HB7
1040 DATA &H3F,&H79,&HB7,&H3F
1050 DATA &H80,&HB7,&H3F,&H7E
1060 DATA &H43,&HB7,&H3F,&H81
1070 DATA &HA6,&H1F,&HB7,&H3F
1080 DATA &H78,&HB7,&H3F,&H7B
1090 DATA &HB7,&H3F,&H7D,&HA6
1100 DATA &H01,&HB7,&H3F,&H7A
1110 DATA &HB7,&H3F,&H7C,&HB7
1120 DATA &H3F,&H7F,&HB6,&H3F
1130 DATA &H78,&H81,&H01,&H26
1140 DATA &H29,&H8E,&H00,&H00
1150 DATA &HF6,&H3F,&H67,&HC4
1160 DATA &H0F,&H26,&H03,&H30
1170 DATA &H88,&H10,&H30,&H1F
1180 DATA &H34,&H10,&HFC,&H3F
1190 DATA &H66,&HE3,&HE4,&HFD
1200 DATA &H3F,&H66,&HFC,&H3F
1210 DATA &H6C,&HE3,&HE4,&HFD
1220 DATA &H3F,&H6C,&HFC,&H3F
1230 DATA &H70,&HE3,&HE1,&HFD
1240 DATA &H3F,&H70,&HB6,&H3F
1250 DATA &H7A,&H2A,&H2A,&H8E
1260 DATA &H00,&H00,&HF6,&H3F
1270 DATA &H6B,&HC4,&H0F,&HC1
1280 DATA &H0F,&H26,&H02,&H30
1290 DATA &H10,&H30,&H01,&H34
1300 DATA &H10,&HFC,&H3F,&H6A
1310 DATA &HE3,&HE4,&HFD,&H3F
1320 DATA &H6A,&HFC,&H3F,&H6E
1330 DATA &HE3,&HE4,&HFD,&H3F
1340 DATA &H6E,&HFC,&H3F,&H74
1350 DATA &HE3,&HE1,&HFD,&H3F
1360 DATA &H74,&H39,&H01,&H80
1370 DATA &H40,&H20,&H10,&H08
1380 DATA &H04,&H02,&H01,&H80
```

CoCo's Best
& Fastest
Spreadsheet

RS-DOS
VERSION
(WITH GRAPHICS)

DYNACALC®

Computer Systems Center
42 Four Seasons Center #122
Chesterfield, MO 63017
(314) 576-5020

OS-9
VERSION

Exclusively
from
Radio Shack
Stock No. 26-3275

Works with 80-Column Hardware

Sugar Software

The CoCo Calligrapher

Use your CoCo, your 8-bit dot addressable graphics printer and the **CoCo Calligrapher** to create beautiful signs, invitations, flyers, greeting cards, diplomas, certificates, awards and love letters.

The original **Calligrapher** letters are 36 points (1/2 inch) high and variably spaced. It includes an easy-to-use , menu-oriented program and these three typestyles:

Old English **Cartoon**

Old English Cartoon

Gay Nineties

Gay Nineties

The CoCo Calligrapher requires 32K ECB.

Tape $24.95/Disk $29.95

ADDITIONAL TYPESTYLES

These tapes of additional typestyles are available for **$19.95 each**. They can be easily moved to disk. ***The original Calligrapher program is required.***

Tape 1 - Reduced, Reversed, and Reduced-Reversed versions

Old English **Gay Nineties** **Cartoon**

uvwxynoldsbabcde

All typestyles on Tapes 2, 3, 4, 5, and 6 include Standard (1/2 inch), Reversed, Reduced, and Reduced-Reversed unless otherwise noted.

Tape 2: Broadway/Old Style

Broadway Oldstyle

Tape 3: Business/Antique

Business Antique

*These disks of additional typestyles are available for **$49.95** each.*

Disk 1 - all type styles on Tapes 1, 2 and 3.

Disk 2 - all type styles on Tapes 4, 5 and 6.

Tape 4: Wild West/Checkers

Wild West Checkers

Tape 5: Star **Hebrew**

Stars שלום

Victorian (Standard and Reverse only)

Victorian

Tape 6: Block/Computer

Block

COMPUTER

The OS-9 Calligrapher

$39.95

Requires OS-9 Version 01.01.00 and a dot matrix printer. **The OS-9 Calligrapher** reads a standard input text file which contains text and formatting directives to produce standard utput for printer or disk. You can specify which font to use; centering; left, right or full justification; line fill; narrow mode; margin; line width; page size; page break and indentation.

*These disks of additional typestyles are available for **$49.95** each.* They are not compatible with the **CoCo Calligrapher** typestyles or program. OS-9 typestyle disk must be used with the **OS-9 Calligrapher.**

Disk 1 - OS-9 version of all type styles on Tapes 1, 2 and 3.

Disk 2 - OS-9 version of all type styles on Tapes 4, 5 and 6.

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Distributors, Ltd., P.O. Box 11932, Edmonton, Alberta T5J-3L1, (403) 421-8003.

Disk software compatible with Radio Shack DOS only.

SUGAR SOFTWARE
1710 N. 50th Ave.
Hollywood, Florida 33021
(305) 981-1241

A complete catalog of other sweet Sugar Software products is available.

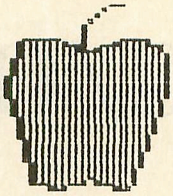
Add $1.50 per program for postage and handling. Florida residents add 5% sales tax. COD orders are welcome. CIS orders EMAIL to 70405, 1374. **No refunds or exchanges.**

MasterCard VISA

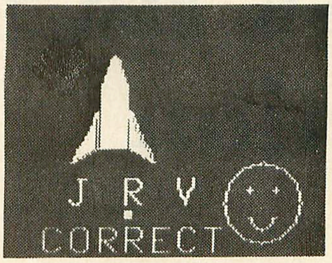
Sugar Software

For the serious student . . .
. . . . from Preschool to College . . . .

- Ages 3-5
- Hand-eye coordination
- Colors
- Shapes
- Numbers
- Great graphics and music
- Reading readiness skills
- Capital letters
- Small letters
- Learn to associate letters and letter blends with the sounds they make
- Requires 32K ECB and joysticks

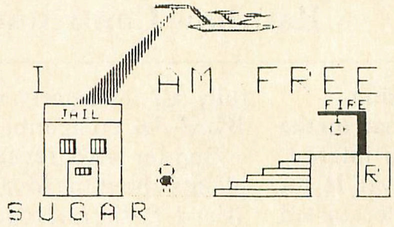


PreReader



$19.95 -Tape
$24.95 - Disk

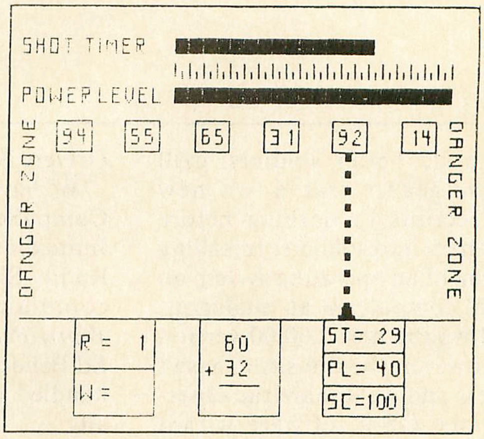
GALACTIC HANGMAN



Both 16K ECB and 32K ECB versions included on tape
$17.95

- For grade 2 and up
- Exciting version of popular word guessing game
- Play against the computer or a friend
- Outstanding high-resolution graphics and animation
- Great sound effects and music
- 700 word vocabulary included
- Create your own word files
  - your child's spelling list
  - foreign language vocabulary
  - specialized word list, i.e., geographic, chemistry, physics
- Broaden your vocabulary
- Both 16K ECB and 32K ECB versions included on tape
- Easily moved to disk

MATH MISSION



Math Mission is an educational game designed to reinforce early math skills in the four math operations:

Addition
Subtraction
Multiplication
Division

- ***Can be played on any of four optional levels of difficulty***
- ***Joystick oriented to develop hand-eye coordination***
- ***Shot timer simulates a classroom time test***
- ***Picture, sound, and word rewards***

***MATH MISSION** requires 32K ECB and 1 joystick*

Available on both Tape and Disk
$24.95, either version

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Distributors, Ltd., P.O. Box 11932, Edmonton, Alberta T5J-3L1, (403) 421-8003.

Disk software compatible with Radio Shack DOS only.

SUGAR SOFTWARE
1710 North 50th Avenue
Hollywood, Florida 33021
(305) 981-1241

A complete catalog of other sweet Sugar Software products is available.

Add $1.50 per program for postage and handling. Florida residents add 5% sales tax.

COD orders are welcome. CIS orders EMAIL to 70405, 1374. No refunds or exchanges.

MasterCard VISA

KISSable OS-9

The Disk BASIC/OS-9 Connection

By Dale L. Puckett
Rainbow Contributing Editor

To build better soldiers, drill sergeants tear down new recruits to nothing before rebuilding them into soldiers. Installing a new version of an operating system on the personal computer is an analogous process. I love the new 2.00.00 version of OS-9. However, the transition hasn't been painless and we'll share the observations of one OS-9 software wizard this month.

We'll take an in-depth look at a new product that should make it easier for dedicated Disk BASIC users to enter the OS-9 world. We'll also introduce several new RAM disks and show different ways to use them, plus spotlight some programs from Kevin Kuehl. To show how the same job can be done with two different languages, we are listing versions written in both assembly language and C.

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Official Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale works as a U.S. Coast Guard chief warrant officer and lives in Alexandria, Virginia.*

Drivers Needed for New Version

We have been reading the mail on the CompuServe OS-9 SIG with interest. Immediately after OS-9 Level II hit Radio Shack shelves, people started complaining their *Word-Pak* and *Word-Pak II* drivers would not work. Ed Bender, the software wizard at PBJ, handled most of the inquiries personally.

Bender worked hard with a disassembler and a little assistance from Fort Worth to get the new drivers online. But, the new drivers were not compatible with the earlier *Word-Pak* drivers or the *O-Pak* drivers from FHL.

"We didn't have much trouble implementing the drivers for the *Word-Pak* once we figured out what Microware did with the CO80 driver for the phantom Tandy video board," Bender said. "Most of our problems came after the fact and we have been getting some complaints about the reduced screen control functions implemented in the current version.

"Actually, this is good and bad at the same time," Bender said. "Someone had to define a standard for screen control functions. While this was somewhat accomplished by *O-Pak* and *Word-Pak*, much of Tandy's OS-9 software was not compatible with either. Now, it is guaranteed that all Tandy (and hopefully all third-party software) will be *Word-Pak* compatible."

Bender also received some complaints about the loss of control for the *Word-Pak II* screen control relay. *Word-Pak II* users with a single composite video-monitor connected to *Word-Pak II* and the standard CoCo video output can no longer switch the screen back and forth to alternately display graphics and text.

For example, if you were editing a BASIC09 program that used graphics with the earlier PBJ drivers the *Word-Pak II* display could be used to edit it. Later, when running the program, the screen could display text while the graphics were being drawn. Now, the only solution is a POKE to *Word-Pak II* to switch the screens back and forth — a method that does not find favor with OS-9 purists.

Bender has an idea that may solve the problem: "First, create a small OS-9 procedure that, once invoked, would put itself to sleep, only to wake up once every second or two to check the path descriptor for TERM to see if the TYPE byte has been changed," Bender said. "If a change is detected, toggle the screen control relay to the appropriate display. The program should be simple and use very little CPU time."

Bender also noted that something

needs to see if GRFO is active in order to control the graphics display. This program needs to allow all other programs to run concurrently with it.

Bender says PBJ has had very few complaints about the loss of control for the scroll rate of *Word-Pak II*. But, they have had many complaints about the loss of cursor-style control and they plan to fix it.

> ***"This structure is invisible to Disk BASIC and requires no knowledge of OS-9."***

"Please point out that the way CO80 is linked into CCIO as a subroutine makes it nearly impossible to add display codes to the CO80 module without patching CCIO," Bender said. "Any codes other than those defined by Tandy are not passed on to the CO80. So, even if the routines are in place, they never get called. The cursor-style control is an exception, since Tandy provided a sequence to change the cursor color in CO32."

Here's good news for people using public domain *Word-Pak* drivers. A new public domain driver for *Word-Pak II* that runs with Version 2.00.00 is now available in he DL6 database on the CompuServe OS-9 SIG, according to SysOp Wayne Day. The new offering was written by Bill Dickhaus, the OS-9 section leader on the CoCo SIG.

CO80 Patches Work with DISTO Display 80

Dennis McMillan has contributed a set of patches to Delphi's CoCo SIG. They let the DISTO Display 80 adapter card work with the CO80 subroutine module that is standard with Tandy's Version 2.00.00 of OS-9. Some of you may want to use them to maintain a strict Tandy standard.

However, many may want to use the new DISTO drivers that Brian Lantz is writing. They will be compatible with *O-Pak* and the old *Word-Pak* drivers and will eliminate some of the shortfalls in the Tandy CO80 module.

In the Tandy CO80 module, there are six occurrences of $FF78. To make the DISTO board work with the module, change each $FF78 to $FF54. Also set the ":switch" at $FF57 to "on" before booting OS-9. Here is the list of offsets supplied by McMillan.

```
. <SPACE>.+24
. <SPACE>.+48
. <SPACE>.+19
. <SPACE>.+3E
. <SPACE>.+EF
. <SPACE>.+69
```

Note that these offsets move from one to the next. You do not need to link to CO80 each time — only the first time. After making these changes, save them in a file and store them in the modules directory of the "Boot/Config" disk so they can be loaded easily. Or install them into the boot file with the Config utility.

With the additional capability made possible by the new hardware from Tandy and third-party vendors, we must make choices about managing the operating system on our Color Computers. OS-9's modularity makes it possible and new hardware and software make it fun. Next month we hope to review the concept of modularity and introduce several approaches to the management of our Version 2.00.00 system software.

WBASIC — An OS-9 Disk that Thinks It's Disk BASIC

Late last year, Alan Reinhart of Royersford, Pennsylvania, had a novel idea. Today, he has a major product, and CoCo users migrating to OS-9 time will find it very interesting. *WBASIC* is a ROM-based program. It replaces Disk Extended BASIC and stores Disk BASIC data and programs in OS-9 formatted files on a hard disk.

When I saw *WBASIC*, I was immediately impressed. Reinhart had written code that makes directories on an OS-9 formatted hard disk look like standard Disk BASIC floppy disks.

Why is this significant? Since the entire hard disk uses a standard OS-9 format, OS-9 programs and data can be stored on it also. And, since the "RSDOS Floppy" directories are actually OS-9 directories, OS-9 application programs and utilities can also read from or store data in them. People with a heavy investment in standard Disk BASIC programs and data can continue to use their original programs and accumulated data while they move up into full OS-9 operation.

With *WBASIC* you can copy a floppy disk containing a number of *Elite, VIP*

OS-9™ SOFTWARE/HARDWARE

SDISK—Standard disk driver module allows the full use of 35, 40 or 80 track double sided disk drives with COCO OS-9 plus you can read/write/format the OS-9 formats used by other OS-9 systems. (Note: you can read 35 or 40 track disks on an 80 track drive). Now updated for OS-9 ver. 02.00.00 **$29.95**

SDISK + BOOTFIX—As above plus boot directly from a double sided diskette **$35.95**

L1 UTILITY PAK—Contains all programs from Filter Kits Nos. 1 & 2 plus Hacker's Kit #, plus several additional programs, Over 35 utilities including "wild card" file cmds, MacGen command language, disassembler, disk sector edit and others. Very useful, many of these you will find yourself using every time you run your system. These sold separately for over $85. **$49.95**

SKIO—Hi res screen driver for 24 x 51 display; does key click, boldface, italics; supports upgraded keyboards and mouse. With graphics screen dump and other useful programs. **Now UPDATED FOR OS-9 Ver 2.0 $29.95**

PC-XFER UTILITIES— Utilities to read/write and format ss MS-DOS™ diskettes on CoCo under OS-9. **$45.00 (requires SDISK)**

CCRD 512K Byte RAM DISK CARTRIDGE—Requires RS Multipak interface, used with driver software below provides 1/2 MB OS-9 RAM disk. **$259.00** **(Prices subject to change).**

CCRDV OS-9 Driver Software for CCRD—$20.00

All disk prices are for CoCo OS-9 format; for other formats, specify and add $2.00 each. Order prepaid or COD, VISA/MC accepted, add $1.50 S&H for software, $5.00 for CCRD; actual charges added for COD.

D.P. Johnson, 7655 S.W. Cedarcrest St.
Portland, OR 97223 (503) 244-8152

(For best service call between 9-11 AM Pacific Time)

OS-9 is a trademark of Microware and Motorola Inc.
MS-DOS is a trademark of Microsoft, Inc.

or other Color Computer word processor files; edit with an OS-9 word processor like *DynaStar* or *Stylograph*; check spelling with an OS-9 program like *DynaSpell* and print using an OS-9 text processor like *TS Word. WBASIC* should ease the entry of thousands of Color Computer users into the OS-9 computing world.

"The existing Disk BASIC file structure has no real expansion cababilities," Reinhart said. "Several vendors selling Winchester drives discovered that quickly. Managing the 20,480 sectors on a five-megabyte disk instead of the usual 620 sectors on a floppy has been a real problem. Several attempts have been made to solve the problem by placing a number of standard floppy-sized volumes on a hard disk drive but this approach is not totally successful."

Reinhart came up with his method because he was concerned about what he perceived as a "go to OS-9 or forget it" policy at Tandy.

"Their policy is fine if you are interested in working with OS-9," Reinhart said. "But, if you are just starting and are not interested, there was no easy answer."

A common file structure lets Reinhart's *WBASIC* talk to OS-9. While Disk BASIC has been hard-coded to live in a 35-track, single-sided environment, OS-9 was designed for expandability.

"I have recreated the OS-9 file handling system with my own code," Reinhart said. "The result is the Disk BASIC user gains the benefit of a second, more capable file structure while keeping compatibility with the old. But, at the same time, OS-9 users can now write short programs in Disk BASIC then boot OS-9 and access the same data files from BASIC09."

WBASIC uses the drive number part of a file specification to communicate with the hard disk drive. Drive numbers 4 through 13 are placed on the hard disk, each in its own directory. This structure is invisible to the Disk BASIC user and requires no knowledge of OS-9. However, to use OS-9, simply type `DOS` and log to the Winchester. OS-9 users see a standard OS-9 disk.

To make *WBASIC* work, Reinhart did his homework with *Disk Basic Unraveled.* He located the addresses where he could intercept the various Disk BASIC statements and jump to his own code. When you use a *WBASIC* OPEN statement with a drive number higher than three, it creates an OS-9 file in a directory on the hard disk drive.

Reinhart stores all Disk BASIC flop-

Metric Industries

Model 101 Interface $39.95

The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). The 101 is only 4" × 2" × 1" and comes with all cables and connectors for your computer and printer.

The Model 104 Deluxe Interface $51.95

The Model 104 is a serial to parallel interface like the Model 101 but it has the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5" × 2.5" × 1.25" and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.

Model 103 Combo $68.95

With the turn of a knob the model 103 switches your computer's RS232C serial port to any one of 3 outputs — 2 serial and 1 parallel. The serial ports may be used for modems, serial printers or even another computer. The parallel port can be used with any Centronics compatible printer. The 103 has the best features from the 101 and 102: color coded position indicator lights, 6 switch selectable baud rates, heavy anodized aluminum cabinet, and many more.

Model 102 Switcher $35.95

The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.

Cassette Label Program $6.95

New Version 1.2-Tape transferrable to disk. Now save and load Labels from tape or disk.

This fancy printing utility prints 5 lines of information on pinfeed cassette labels. "Cassette Label" is menu driven and is very easy to use. It uses the special features of your printer for standard, expanded or condensed characters. Each line of text is automatically centered. Before the label is printed, it is shown on your CRT — enabling you to make changes if you like — then print 1, 2 or 100 labels. The program comes on tape and it is supplied with 24 labels to get you started. 16K ECB required.

CASSETTE LABEL
CASSETTE LABEL PRINTING UTILITY
(C) 1984 METRIC INDUSTRIES CINCINATI, OHIO

Other Quality Items

High Quality 5 Screw Shell C-10 Cassette Tapes **$7.50 per dozen**

Hard Plastic Storage Boxes for Cassette Tapes **$2.50 per dozen**

Pin Feed Cassette Labels
White **$3.00 per 100**
Colors **$3.60 per 100** (Red, Blue, Yellow or Tan)

VISA MasterCard

THE 101, 103 AND 104 ALL REQUIRE POWER IN ORDER TO OPERATE. MOST PRINTERS CAN SUPPLY POWER TO YOUR INTERFACE. STAR, RADIO SHACK, AND OKIDATA ARE JUST A FEW THAT DO. EPSON DOES NOT. THE INTERFACES CAN ALSO BE POWERED BY AN AC ADAPTER (RADIO SHACK MODEL 273-1431 PLUGS INTO ALL MODELS). IF YOU REQUIRE A POWER SUPPLY, ADD A "P" TO THE MODEL NUMBER AND $5.00 TO THE PRICE. (MODEL 101P $44.95, MODEL 104P $56.95 AND MODEL 103P $73.95)

The Model 101, 102, 103 and 104 will work with any COCO, any level basic and any memory size. These products are covered by a **1 year warranty.**

The Model 101, 103 and 104 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Okidata, C. Ioth and many others. They support BASIC print commands, word processors and graphic commands.

We manufacture these products. Dealer inquiries are invited.

To order call our 24 hour order line 513-677-0796 and use your VISA MASTERCARD request C.O.D. or send check or money order to:

Metric Industries
P.O. Box 42396
Cincinnati, OH 45242

Free shipping on orders over $50.00. Ohio residents add 5.5% sales tax.
Orders under $50.00 please add $2.50 for shipping.

Listing 1: *COMM.C*

```
/* COMM:  A UNIX-like utility to print  non-identical  lines  in
two files.
   Microware C Language

   Kevin Kuehl
   806 Division Road
   Valparaiso, IN 46383
   February 5, 1986

   Calls:   comm file1 file2
            comm file1 <file2

*/
#include <stdio.h>
#include <ctype.h>

main(argc, argv)
int argc;
char **argv;
{
     FILE *fp1, *fp2, *fopen();

     if (argc == 1)
          error("Usage: comm file1 [file2]", NULL);

     else if (argc == 2)
          if (fp1 = fopen(*++argv, "r")) {
               comm(fp1, stdin);
               fclose(fp1);
          } else
               error("Can't open", *argv);

     else if (fp1 = fopen(*++argv, "r"))
          if (fp2 = fopen(*++argv, "r")) {
               comm(fp1, fp2);
               fclose(fp1);
               fclose(fp2);
          } else
               error("Can't open", *argv);
     else
          error("Can't open", *argv);
}

compare(string1, string2)
char *string1, *string2;
{
     while (isspace(*string1))
          *string1++;

     while (isspace(*string2))
          *string2++;

     return(strcmp(string1, string2));
}

comm(ptr1, ptr2)
FILE *ptr1, *ptr2;
{
     char line1[120], line2[120];
     static char filler[10] = "     ";
     int length1, length2;

     while  (fgets(line1, 120, ptr1) && fgets(line2, 120, ptr2))
{
          length1 = strlen(line1);
          length2 = strlen(line2);
```

pies or directories in a master directory named RSDOS. Each floppy is actually a subdirectory named RSDOS0 to RSDOS9. When you type a Disk BASIC command line like `DIR 8`, *WBASIC* performs the equivalent of the OS-9 command, DIR /HO/RSDOS/RSDOS8.

To make room for his code, Reinhart moved the start of Disk BASIC's free memory area from $0989 to $0C00. This means that any Disk BASIC machine language programs that are not position-independent and start at $0989 do not work with *WBASIC*. However, Reinhart says he has tested hundreds of programs and almost all of them work.

New RAM Disks Increase OS-9 Speed

I met Tony DiStefano for the first time at RAINBOWfest-Palo Alto and one of the things we discussed was his new Super RAM Disk. I was so impressed with his products that I bought a 512K Super RAM cartridge and a DISTO Controller with an enhanced Display 80 adapter.

When DiStefano came up with the idea to add adapters to his controller and RAM disk cartridges, he solved a lot of problems. Some of us have had our Multi-Pak slots full for a while. We have been wondering how to add more hardware like the Radio Shack Speech Cartridge to our CoCo. Tony has come to the rescue.

Many people at Palo Alto were impressed, too. By the time I talked to Tony, his distributor (CRC Inc., 10802 Lajeunesse, Montreal, Quebec, Canada H3L 2E8, phone 514-383-5293) had sold out. I had to order mine.

Bob Rosen — WHIFFLE on Delphi's Color Computer SIG — helped me out. He shipped Tony's 256K Super RAM cartridge and it arrived the next day. The 256K Super RAMDisk sells for $129.95. The 512K version costs $169.95.

I quickly installed the OS-9 RAM Disk drivers licensed by Brian Lantz and was soon working with a 512K CoCo: the DISTO Super RAMDisk plus the *ThunderRAM*. My own 512K Super RAM has also arrived and very soon I'll be cooking with a 768K CoCo. And, as if that weren't enough, DiStefano has made it possible to put an additional 512K of RAM on his Super RAM cartridge. If I added that 512K, I would be running with 1280K — in a CoCo. I'm impressed.

Getting the Most from RAMDisk

Brian Lantz certainly gives versatility

in the RAMDisk software for the Super RAM cartridge. A ready-made device descriptor makes the 256K RAM disk look like a single-sided, 40-track floppy disk. Data and programs can be moved quickly from a floppy to the RAM disk using the OS-9 Backup utility command. It takes less than 40 seconds to do the whole job.

A modules directory on the disk contains a device descriptor that covers almost every option. The descriptors are in the correct format to work with the Config utility that comes with Version 2.00.00. By selecting the proper descriptor, you pick the number of the drive, either R0, R1 or R2; the Multi-Pak slot number desired, one through three; and the size of the RAM disk, either 256K or 512K.

After I had used the RAMDisk as the mirror of a single-sided, 40-track disk for several weeks I decided to take a closer look. I discovered that I was losing 77,824 bytes or 304 sectors of high speed RAMDisk by operating in this mode. There are 262,144 bytes or 1,024 sectors of memory available on the DISTO Super RAMDisk. However, the 40-track floppy can only only 184,320 bytes or 720 sectors.

At first, I thought I had only two alternatives. I could run the RAMDisk as a single-sided, 40-track drive and gain the advantage of the high-speed backup operation. Or, I could configure the RamDisk with 1,024 sectors and use all available RAM. Unfortunately, with the latter method I would need to use the Dsave utility command to copy OS-9 directories or disks to the RAMDisk — an operation that takes several minutes.

After a little thought I decided to take advantage of my double-sided, 40-track drives. I would use both sides of the drive, but not all of the tracks. I wound up formatting a disk with 56 tracks — 28 per side. This produces 1,008 sectors of storage.

I called up the OS-9 Debug utility and modified the /R1 device descriptor to make the RAMDisk look like 28 tracks with 18 sectors per track on two sides. I then used the new Version 2.00.00 Format utility to create the disk. Format ran properly and the OS-9 Free utility command reported that I had 1,008 sectors available. I moved right ahead and ran the Backup utility program. Backup up ran successfully and copied about half of the special 28-track double-sided disk. Then it reported a Media Full error. It made sense to me that you can't have two sides on a

```
          line1[length1 - 1] = line2[length2 - 1] = '\0';

          if (compare(line1, line2))
               printf("%-25.25s  %-25.25s\n", line1, line2);
          else
               printf("%52.52s  %-25.25s\n", filler, line1);
     }
}

error(err1, err2)
char *err1, *err2;
{
     fprintf(stderr, "COMM: %s %s\n", err1, err2);
     exit(0);
}
```

Listing 2: ***TR.C C***

```
/* TR: A UNIX-like transliteration utility.
   Microware C Language

   Kevin Kuehl
   806 Division Road
   Valparaiso, IN 46383
   January 20, 1986

   Calls:  tr from to <file   changes 'from' to 'to'
           tr from <file   deletes 'from'

*/
#include <stdio.h>

int not = FALSE;      /* Regular pattern match */
int squeeze = FALSE;  /* Do not compress repeated characaters */

main(argc, argv)
int argc;
char **argv;
{
     char set1[4], set2[4];
     int argcount = 3;

     if (argc == 1) {
          fprintf(stderr, "Usage: tr [-s] to from\n");
          exit(0);
     } else if ((*++argv)[0] == '-') {
          if (((*argv)[1] == 's') || ((*argv)[1] == 'S')) {
               squeeze = TRUE;
               argv++;
               argcount++;
          } else
               error("Parameter error ", *argv);
     }

     if (makeset(*argv, set1) == FALSE)
          error("Parameter error ", *argv);

     if (argc == argcount) {
          if (makeset(*++argv, set2) == FALSE)
               error("Parameter error ", *argv);
     } else
          makeset(NULL, set2);

     translit(set1, set2);
}

convert(c, conversion, boundptr)
char c, conversion;
char *boundptr;
{
     c = c - conversion + *boundptr++;
     if (c > *boundptr)
          c = *boundptr;

     return(c);
}

error(errl, err2)
char *errl, *err2;
{
     fprintf(stderr, "TR: %s %s\n", errl, err2);
     exit(0);
}

makeset(param, set)
char *param, *set;
{
     int ptr;

     for (ptr = 0; ptr < 4; ptr++)
          set[ptr] = NULL;

     if (*param == '~') {
          not = TRUE;
          param++;
     }

     set[0] = param[0];
     if (set[0] != NULL)
          switch (strlen(param)) {
               case 1:
                    set[1] = param[0];
                    break;
               case 3:
                    set[1] = param[2];
                    break;
               case 2:
                    set[1] = param[0];
                    set[2] = param[1];
                    set[3] = param[1];
                    break;
               case 6:
                    set[1] = param[2];
                    set[2] = param[3];
                    set[3] = param[5];
                    break;
               default:
                    return(FALSE);
            }
            return(TRUE);
  }

  translit(from, to)
  char *from, *to;
  {
       char c, lastc = '\0';

       while ((c = getchar()) != EOF) {
            if (c >= from[0] && c <= from[1]) {
                 if (not == FALSE)
                      c = convert(c, from[0], &to[0]);
            } else if (c >= from[2] && c <= from[3]) {
                 if (to[2] == NULL) {
                      if (not == FALSE)
                           c = convert(c, from[2], &to[0]);
                 } else if (not == FALSE)
                      c = convert(c, from[2], &to[2]);
```

RAMDisk, but I thought I could fool the software.

As it turned out, I did fool the software by taking a different approach. Fortunately for my experiment, the Backup utility command does not check everything when it looks to see if the two disk formats are the same. It only checks the total number of sectors.

After discussing the problem with Brian Lantz, I changed the number of sides in the RAMDisk descriptor back to one and changed the number of tracks to 56 rather than 28. I left the number of sectors per track set to 18 so it would match the floppy media. I saved the new version of the device descriptor again, ran the Attr utility command on it to set the execute and public execute attributes of the new file.

Then, I formatted the RAMDisk again using the new descriptor. Free again reported 1,008 sectors available. I ran Backup again. It worked.

What did I gain from the experiment? Time, mainly. When I did a backup from my specially formatted 28-track, double-sided floppy to the RAMDisk it took 41 seconds. Then, I ran *DirCopy*, a fast directory copy utility from Computerware. It took three minutes and 26 seconds.

You probably noticed that this method does not use 4,096 bytes of the 256K available on the RAMDisk. I wasted 16/18 of a track. You can get around this by modifying the device descriptor for the floppy disk so you can format the double-sided 40-track disks in an even more non-standard fashion.

For example, why not format them to hold 64 tracks (32 tracks on two sides) with 16 sectors in each track? This gives exactly 262,144 bytes or 1,024 sectors on the floppy. A RAMDisk formatted this way does the job nicely and wastes no space. Since you won't be exchanging these non-standard floppies with anyone, set them up any way you desire.

I haven't decided how to handle my 512K RAMDisk yet. If I buy a double-sided, 80-track disk I could use a similar trick. 512K of RAM holds 2,048 sectors. If I formatted a disk to hold 128 tracks (64 on each side) with 16 sectors in each track it should work perfectly. To maintain the 18 sectors per track standard so the device descriptor won't have to be modified for the 80-track floppy disk, set it up with 112 tracks (56 tracks on each side) containing 18 sectors per track.

Changing Device Descriptors

To change the device descriptors used

by the floppy disk drives, use the OS-9 Debug utility command. We'll go step by step, but first we need to give a short description of a device descriptor.

Following the standard module header in every device descriptor that uses the RBF file manager, there is a table that defines the disk drive being used. The first byte of the table is located 18 decimal bytes ($12 bytes hexadecimal) from the start of the module containing the device descriptor. The following table shows the offset from the start of the module, the name of the location in the OS9Defs files and a short description of the information it contains.

Offset	Name	Description
$12	IT.DTP	Type of device (always 01 for disk drives)
$13	IT.DRV	Drive number (DISTO slot number)
$14	IT.STP	Step rate (00 for RAMDisks)
$15	IT.TYP	Device type
$16	IT.DNS	Media density
$17	IT.CYL	Number of tracks
$19	IT.SID	Number of sides
$1A	IT.VFY	Verify if 00, no verify if 01
$1B	IT.SCT	Number of sectors per track
$1D	IT.TOS	Number of sectors per track in Track 0

To change the format on the RAMDisk and floppies, change IT.CYL, the number of tracks and IT.SCT, and the number of sectors per track. To start, type:

```
OS9: debug <ENTER>
```

When you see the Debug prompt, D:, type:

```
L R0 <ENTER>
```

This links debug to the start of the module containing the device descriptor named R0. Use the name of the device descriptor you want to modify here. After linking to the descriptor, move to the byte containing the number of tracks. Since it is at an offset of $17 hexadecimal bytes from the start of the module, type:

```
. <SPACE> .+17 <ENTER>
```

Notice how the debug utility commands use hexadecimal notation for these offsets. Displayed now is an address followed by the value of the data stored at that address. It should contain two zeros (00).

```
        } else if (not && (c != '\n'))
            c = to[0];

        if (squeeze && (c == lastc))
            ;   /* If we compress repeats, then do nothing */
        else
            putchar(c);
        lastc = c;
    }
}
```

Listing 3: ***COMM.A***

```
* COMM: A UNIX-like file comparison utility with three columns
* 6809 Assembly Language
*
* Kevin Kuehl
* 806 Division Road
* Valparaiso, IN 46383
* February 5, 1986
*
* Calls:  comm file1 file2    compares 'file1'  to  'file2'  and
prints lines
*          comm  -1  file1  file2 print only identical lines and
from 'file2'
*
*
 NAM Comm

 IFP1
 USE /D0/DEFS/OS9Defs
 ENDC

 MOD commend,commnam,PRGRM+OBJCT,REENT+1,comment,commmem
commnam FCS /Comm/

*************************************
*
* DATA AREA
*
 ORG 0
flag RMB 1
path1 RMB 1
path2 RMB 1
buffer1 RMB 120
buffer2 RMB 120
storage RMB 120
 RMB 200 Parameter Area
 RMB 200 Stack Area
commmem EQU .

*************************************
*
* PROGRAM AREA
*
comment CLR flag we print all columns
 CLRB clear the flag holder
comm05 LDA ,X get first parameter character
 CMPA #'- is it an option?
 BNE opnfile no, then open the files
 LEAX 1,X bump up the pointer
comm10 LDA ,X+ get next character
 CMPA #$0D are we done?
 LBEQ errmsg yes, then syntax error
 CMPA #$20 or just some white space?
 BEQ opnfile yes, then go
 CMPA #'1 do we blank first column?
 BNE comml5 not yet, go
 ORB #%00000001 yes, set the flag
 BRA comml0 and go for more
comml5 CMPA #'2 do we blank second column?
 BNE comm20 not yet, go
 ORB #%00000010 yes, set the flag
 BRA comml0 and go for more
comm20 CMPA #'3 do we blank third column?
 LBNE errmsg no, then syntax error
 ORB #%00000100 set the flag
 BRA comml0 and go for more
opnfile STB flag save the option flag
 LDA #READ. use READ access mode
 OS9 I$OPEN open the first file name
 LBCS error branch on error
 STA pathl save the path number
 LDA #READ. use READ access mode
 OS9 I$OPEN open the second file name
 LBCS error branch on error
 STA path2 save the path number
readin LEAX bufferl,U point to the first buffer
 LDY #120 get its length
 LDA pathl get the path number
 OS9 I$READLN read a line of input
 LBCS commerr branch on error
 TFR Y,D put line length in 'B'
 STB -1,S save it for a bit
 LEAX buffer2,U point to the second buffer
 LDY #120 get its length
 LDA path2 get the path number
 OS9 I$READLN read a line of input
 LBCS commerr branch on error
 TFR Y,D put line length in 'B'
 LEAX bufferl,U else point to the first line
 LEAY buffer2,U and also to the second line
 CMPB -1,S are the lengths the same?
 BNE test05 no, then go
test DECB are we done?
 BEQ test30 yes, then we must go
 LDA ,X+ else get a character in line 1
 CMPA ,Y+ is it the same as in line 2?
 BEQ test yes, then get next character
test05 LDB #25 get length of first section
 LEAX bufferl,U point to the first line
 LEAY storage,U point to the out line
 LDA flag get the flag
 CMPA #%00000001 do we print this column?
 BEQ testl5 no, but we print second
 CMPA #%00000011 do we print any columns?
 BEQ readin no, we print nothing
testl0 LDA ,X+ get the next character in line
 CMPA #$0D is it a carriage return?
 BEQ testl5 yes, then go
 STA ,Y+ no, then save the character and bump 'Y'
 DECB are we done?
 BNE testl0 no, then store next character
testl5 ADDB #2 add in the spacer length
 LDA #$20 get an ASCII <space>
test20 STA ,Y+ and save it
 DECB are we done?
 BNE test20 no, then save it again
 LDA #$0D get a carriage return
 STA ,Y save in case we need it
 LDA flag get the flag
 CMPA #%00000010 do we print this column?
 BEQ prntthem no, then go
 LDB #25 get length of second section
 LEAX buffer2,U point to second section
test25 LDA ,X+ get the next character
```

Press the ENTER key once to move to the lowest significant byte of the two-byte value being modified. Debug prints the next address followed by a one-byte value. If you are changing the device descriptor of a 40-track drive, Debug returns a value of $28 (hexadecimal) here. Now type an equal sign (=) followed immediately by the new value wanted in the descriptor. For example, to wind up with a 64-track RAM disk, type:

```
=40 <ENTER>
```

Note here that $40 is 64 decimal. After changing the number of cylinders, link to the start of the device descriptor module again like before. Move to the location of IT.SCT, which is at an offset of $1B. Make this change in a similar manner, then check or set the value of IT.TOS. Exit the debug utility by typing a `Q` or `q` as the first letter following the prompt. You then see the standard OS-9 prompt.

At this point, you can use the modified device descriptor. However, you will probably want to save it using the OS-9 Save utility command. If the device descriptor module is named R0 in memory and you want to save it in a file called R0.New, use the following command line.

```
OS9: save R0.New R0 <ENTER>
```

This command line creates a file named R0.New in the current execution directory which is usually /D0/CMDS. The module R0 is stored in that file. Before attempting to load the file, run the Attr utility command to set the execute and public execute attributes for the file.

Banker RAM disk is an Alternative

I recently had a chance to see the J&R Electronics 512K Banker. It supports all versions of the Color Computer and, since it installs inside the Color Computer, a multipack is not needed.

With the Banker you get a RAM Disk. And, since OS-9 already allows printing in the background by using an ampersand (&) at the end of a command line, you get a simple print spooler without buying any special software. When listing a file from the RAM disk to the printer, there is no wait for floppy access, so the system works efficiently at the same time.

The installation procedure for the Banker is simple if you have two drives. Put the system disk in Drive 0 and your Banker OS-9 disk in Drive 1, then run the install procedure file for the type of RAM disk desired and the CoCo does all the rest. A utility that fixes the OS-9 boot disks to boot with the Banker installed is also included.

The Banker can be installed as a 512K or 256K RAM system and it comes in varying levels of completion. Options start with a bare board at $34.95 — you buy the parts — and run up to a completely assembled and tested 512K board that sells for $149.95. Get the details from Jesse at J & R Electronics, P.O. Box 2572, Columbia, MD 21405, phone (301) 987-9067.

All except the assembled and tested 512K board require piggybacking RAM chips for expansion to 512K. If you do not feel comfortable with piggyback chips, purchase their new Memory Expansion Board Kit for $29.95. This kit is necessary to install a Banker in the two-chip Korean CoCo 2s.

KShell Makes Life Pleasant

Computerware's *KShell* is the star of a new set of *Advanced Utilities for OS-9* from Paul Searby's Encinitas, California software house. It's UNIX-like features let you work quicker and smarter. *KShell* is a direct replacement for the standard OS-9 Shell. In fact, internally it is named Shell.

KShell gives you the ability to use wild cards on the OS-9 command line, set the priority of any process and make multipath searches. If you are tired of receiving the Error #216 "File Not Found" message, *KShell*'s path facility will make your day. To install and run it, simply type:

```
OS9: ex load /d0/cmds/kshell <ENTER>
```

A *KShell* path command line looks like this:

```
OS9: path=/d1/cmds <ENTER>
```

After this line is typed, *KShell* first checks the current execution directory when it is looking for a program. If it does not find the program there it looks in /d1/cmds. You are not limited to one additional path, since you can place as many as will fit in a 64-character line. Each path in that line must be separated by a colon. Here's a sample:

```
OS9: path="/r1:/h1/cmds:/d1:cmds" <ENTER>
```

If you forget which paths have been assigned to *KShell*, find out by typing, "`Echo $path`". If you forget something when you type the path, append things to it like this.

```
OS9: path=$path+":/d1" <ENTER>
```

The beauty of these commands is they only need to be typed once. And if you

```
 STA ,Y+ save it and bump 'Y'
 CMPA #$0D is it a carriage return?
 BEQ prntthem yes, then go
 DECB are we done?
 BNE test25 no, then get next character
 LDA #$0D else get a carriage return
 STA ,Y save it in the string
 BRA prntthem print the lines
test30 LDA flag get the flag
 CMPA #%00000100 do we print this column?
 LBHS readin no, then go
 LEAY storage,U point to the line
 LDA #$20 get a SPACE
 LDB #54 get loop count
test35 STA ,Y+ save it in the line
 DECB are we done?
 BNE test35 no, then save some more
 LEAX buffer1,U point to the line
 LDB #25 get amount to be shown
test40 LDA ,X+ get next character
 STA ,Y+ save it in string
 CMPA #$0D is it a carriage return?
 BEQ prntthem yes, then go
 DECB are we done?
 BNE test40 no, then go
 LDA #$0D get a carriage return
 STA ,Y+ save it in the line
prntthem LEAX storage,U point to the line
 LDY #120 get its length
 LDA #1 use standard output
 OS9 I$WRITLN and print the line
 LBCC readin if no error, then go
 BRA error branch on error

errmsg LEAX message,PCR get the message
 LDY #120 get its length
 LDA #2 use STANDARD ERROR path
 CLRB clear the error channel
 OS9 I$WRITLN print the message

commerr CMPB #E$EOF is error and 'EOF'?
 BNE error no, then error exists
 LDA path1 get the path number
 OS9 I$CLOSE and close the file
 BCS error branch on error
 LDA path2 get the path number
 CLRB clear the error channel
 OS9 I$CLOSE and close the file
error OS9 F$EXIT terminate the process

message FCC /Usage: comm [-[1,2,3]] file1 file2/
 FCB $0D

 EMOD
commend EQU *
 END
```

Listing 4: *TR.A*

```
* TR: A UNIX-like transliteration utility.
* 6809 Assembly Language
*
* Kevin Kuehl
* 806 Division Road
* Valparaiso, IN 46383
* February 5, 1986
*
```

```
* Calls:   tr a A <file       converts all 'a' to 'A' in 'file'
*          tr A-Z a-z <file  converts all letters to lower case
*          tr -s a A <file   strips  out  all  same  consecutive
characters
*          tr ~A-Za-z <file  deletes all non-alpha characters
*
*
 NAM Tr

 IFP1
 USE /D0/DEFS/OS9Defs
 ENDC

 MOD trend,trnam,PRGRM+OBJCT,REENT+1,trent,trmem
trnam FCS /Tr/

***********************************
*
* DATA AREA
*
 ORG 0
lastc RMB 1
not RMB 1
squeeze RMB 1
from RMB 4
to RMB 4
set1 RMB 7
set2 RMB 7
line RMB 120
 RMB 200 Parameter Area
 RMB 200 Stack Area
trmem EQU .

***********************************
*
* PROGRAM AREA
*
trent LEAY set1,U point to storage
 LEAY 1,Y leave space for length
 CLR not use regular matching
 CLR set1 length = 0
 CLR set2 length = 0
 CLR squeeze we do not compress lines
 CLRB set counter = 0
tr05 LDA ,X+ get next character
 CMPA #$20 is it white space?
 BEQ tr05 yes, then go
 CMPA #$0D are we done?
 BEQ message yes, then error
 INC not set to use NOT
 CMPA #'~ is it a NOT?
 BEQ tr15 yes, then go
 CMPA #'- do we have an option?
 BNE tr10 no, then go
 LDA ,X+ get next character
 ANDA #%11011111 convert to UPPER CASE
 CMPA #'S do we compress lines?
 BNE message no, then go
 INC squeeze set to compress lines
 BRA tr05 and go for more
tr10 CLR not no, then correct
 STA ,Y+ else save in set
 INCB length = length + 1
tr15 LDA ,X+ get next character
 CMPA #$20 are we at end of string?
 BEQ tr20 yes, then go
 CMPA #$0D or at end of parameter?
 BEQ tr40 yes, then go
```

do it from a procedure file, the whole operation can be semi-automatic. *KShell* also supports up to four macros. Each macro can contain up to 48 characters.

Like the UNIX Shell, *KShell* treats a command placed in single quotes with the output of that command. This sounds complicated, but it makes sense. Look at a few examples:

```
OS9: echo The date is 'date'. <ENTER>
OS9: echo chd 'pxd' <ENTER>
OS9: echo The disk in drive one
     is 'free /d1'<ENTER>
```

The first line prints "The date is" followed by the output of the standard OS-9 date utility command. The second example changes the current data directory to the same as the current execution directory since pxd returns the name of the current execution directory on the standard output path. The last command line works like the first.

The wild cards are the asterisk (*) and the question mark (?). An asterisk matches any number of characters. A question mark matches any single character. Since the files that match the wild cards are substituted in the command line before they are passed to a command, *KShell's* wild cards are available to all programs.

The ability to assign default paths alone makes *KShell* worth the price of the entire *Advance Utilities for OS-9* package. Additionally, you get a new copy utility command named cpy that allows copying multiple files to a given directory.

The archive utility in the package is valuable if you have a hard disk and want the ability to make backup copies easily. Operation is almost automatic and after archive fills one floppy it prompts for a new one.

To round out the package, Computerware includes an unload utility that completely removes modules from memory and a flink utility that gives a way to make any existing file that is contiguous the boot file.

A Helpful Hint

There is a way to make a new boot file that's almost easier than using the new Config utility. First, create a new directory on the disk and copy each file you want in the new OS9Boot file into that directory. Then, instead of creating a separate bootlist file, use either the Microware 'd' utility or the "ls" utility from several of the third-party vendors and type this command line.

```
OS9: ls ! dsave <ENTER>
```

Two from Kuehl

This month, our feature programs were written by Kevin Kuehl, a senior high school student in Valparaiso, Indiana. Kuehl contributed several assembly language programs to "KISS-able OS-9" last summer. He's back with two new programs written in both assembly language and C.

Comm is a utility that compares two text files or a file to standard input. It is handy for programmers who are looking for changes they have made in a source file. *Tr* is a standard translit utility that can squeeze lines and use sets of characters. Sample OS-9 command lines are shown as comments in each listing.

Kuehl also sent some advice with his programs. "Tell everyone how important it is to write their assembly language programs in modules," he said. "This makes them much easier to debug.

"Also, make sure they *always* send their errors to the standard error path," Kuehl added. "It is unnerving to send a file down a pipeline and find (if you are lucky) an error at the end. Or worse yet, garbage that once was an error message. Use LDA #2 in assembly language or "fprintf (stderr, " ") in C for all error messages."

Our Future

The 68K version of OS-9 may very soon be the standard operating system on most home-oriented computer systems. At a recent conference sponsored by Microsoft, Sony and Phillips proposed a new file format standard for the new compact disc technology. OS-9 68K is at the heart of the standard that supports sound and graphics as well as data on the new disks. The CD-I system uses a Motorola 68000 processor and custom graphics and sound processors still under development by Sony and Phillips. The systems may be sold as complete systems or as add-ons to existing audio CD players.

Modularity and Version 2.00.00

Next month we hope to review the concept of modularity and present several approaches to operating system management. We need these skills when adding new hardware and software to our OS-9-based Color Computers. During the process, we'll introduce several new utility packages that help make the job easier. And, we'll publish a few more short programs to give you some programming practice and new tools at the same time. ☐

```
 STA ,Y+ save it in set
 INCB length = length + 1
 BRA tr15 go for more
tr20 STB set1 save the length
 LEAY set2,U point to storage
 LEAY 1,Y leave space for length
 CLRB set counter = 0
tr25 LDA ,X+ get next character
 CMPA #$20 is it white space?
 BEQ tr25 yes, then go
 CMPA #$0D are we at end of parameter?
 BEQ tr40 yes, then go
 STA ,Y+ save in the set
 INCB length = length + 1
tr30 LDA ,X+ get next character
 CMPA #$20 are we done with string?
 BEQ tr35 yes, then go
 CMPA #$0D are we at end of parameter?
 BEQ tr35 yes, then go
 STA ,Y+ save it in set
 INCB length = length + 1
 BRA tr30 go for more
tr35 STB set2 save the length
tr40 LEAX set1,U point to first string
 LEAY from,U point to storage
 LBSR makeset make the set
 TSTB was there an error?
 BNE message yes, then go
 LEAX set2,U point to second string
 LEAY to,U point to storage
 LBSR makeset make the set
 TSTB was there an error?
 BEQ translit no, then go
message LEAX usemess,PCR
 LDY #120 get its length
 LDA #2 use Standard Error path
 CLRB clear the error channel
 OS9 I$WRITLN print the message
 BRA error branch on error

*****************************************
*
* TRANSLIT 'FROM' TO 'TO'
*
translit LEAX line,U point to storage
 LDY #120 get its length
 CLRA use Standard Input
 OS9 I$READLN read the line
 BCS transerr branch on error
 CLR lastc set initial value to NULL
 LEAX line,U point to the line
trans05 LDA ,X get the character
 CMPA #$0D are we done?
 BEQ print yes, then go
 PSHS X save the pointer
 LEAX from,U point to compare set
 LEAY to,U point to adjust set
 CMPA ,X do we change the char?
 BLO trans10 not yet, check more
 CMPA 1,X maybe, is it in range?
 BLS trans15 yes, then convert
trans10 LEAX 2,X push 'X' to second range
 LEAY 2,Y push 'Y' to second range
 CMPA ,X is char in range?
 BLO trans20 no, then go
 CMPA 1,X maybe, is it in range?
 BHI trans20 no, then go
 TST ,Y is there a second adjust range?
 BNE trans15 yes, then use it
 LEAY -2,Y back 'Y' down to first range
trans15 TST not do we have regular matching?
 BEQ convert yes, then convert char
 BRA store then print the character
trans20 TST not do we have regular matching?
 BEQ store yes, then print character
 LDA -2,Y no, then get the character
 BRA store and print character
convert SUBA ,X make 'A' and offset
 ADDA ,Y make 'A' a char in range
 CMPA 1,Y is char in the range?
 BLS store yes, then save char
 LDA 1,Y else get upper limit
store PULS X get old pointer
 TST squeeze do compress line?
 BEQ store05 no, then go
 CMPA lastc do we print the character?
 BNE store05 yes, then save it
 CLRA no, then save a NULL
store05 STA ,X+ save the character
 TSTA is 'A' a character?
 BEQ trans05 no, go for more
 STA lastc else save it as last character
 BRA trans05 go for more
print LEAX line,U point to character
 LDY #120 get its length
 LDA #1 use Standard Output
 OS9 I$WRITLN print the char
 BCC translit no error, go for more
transerr CMPB #E$EOF is error an End Of File?
 BNE error no, then error exists
 CLRB else clear error channel
error OS9 F$EXIT terminate the process

***********************************
*
* CONVERT TO A FOUR CHAR. SET
*
makeset PSHS A,X,Y save these registers
 CLR ,Y make the set a NULL set
 CLR 1,Y
 CLR 2,Y
 CLR 3,Y
 TST ,X do we use the NULL set?
 BEQ mkst20 yes, then go
 LDB ,X+ get the length
 LDA ,X get first character
 STA ,Y save it in set
 CMPB #1 is length one?
 BNE mkst05 no, then go
 LDA ,X get first char
 STA 1,Y save as upper limit
 BRA mkst20 and go
mkst05 CMPB #3 is length three?
 BNE mkst10 no, then go
 LDA 2,X get last char
 STA 1,Y save as upper limit
 BRA mkst20 and go
mkst10 CMPB #2 is length two?
 BNE mkst15 no, then go
 LDA ,X get first char
 STA 1,Y save as upper limit one
 LDA 1,X get next char
 STA 2,Y save as lower limit two
 STA 3,Y and as upper limit two
```

Educational Programs

? Questions ??

Questions — *a powerful, easy to use, authoring program!* **Questions** has as many uses as its owners have creativity. Teachers have used **Questions** to develop pre and post tests, to make copies of the same test with questions in a different order, and to review and reinforce difficult lessons with their students. But **Questions** is not limited to school uses. Enterprising people have found other uses for it. Party-givers have used it to personalize games for baby and wedding showers, and for creating their own trivia games. Administrators have used it for inservice training. Children have written their own riddles with it. If you own **Questions**, you'll find a way to use it. You will also be pleased with its many fine features:

★ Word processing commands that allow you to make changes as you type
★ Screen commands so you do not have to constantly refer to the manual
★ Options to take the quiz on the computer or to print a hard copy of it
★ Sequential or random presentation of questions
★ The ability to print the same test with questions in a different order
★ The printing of an answer key
★ The option to use expanded printer lettering to create large print tests.
★ The ability to save quizzes to cassette or disk
★ A review feature which permits students to study questions that have been missed
★ A record keeping system
★ Multiple choice, true/false, or fill in the blank formats.

Questions is truly a professional authoring program that meets the needs of all of its users.

16K ECB - Cass. $19.95
32K ECB - Cass. $24.95
32K Disk - $26.95

****

Reading Comprehension Series
Grades 2 - 4

B5's **Reading Comprehension Series** is a set of data files to be used with the **Questions** program described above. Each file contains over 100 questions, organized into 6 to 8 sequential lessons. Lessons build from simple to complex. This series emphasizes the thinking aspect of reading. Simple sentence structure allows the student to concentrate on thinking skills.

Main Idea ★ Sequencing
Fact & Opinion ★ Cause & Effect

Each Title: Cassette - $10.95
Disk $12.95
Complete Series of 4 Titles:
Cass. - $39.95; Disk - $41.95

☞ **Most B5 programs are available through *Radio Shack® Express Order.***

A trademark of Tandy Corp;

B-5 Software Co.
1024 Bainbridge Place
Columbus, Ohio 43228
Phone (614) 276-2752

```
 LDA 2,X get last char
 STA 1,Y save as upper limit
 BRA mkst20 and go
mkst10 CMPB #2 is length two?
 BNE mkst15 no, then go
 LDA ,X get first char
 STA 1,Y save as upper limit one
 LDA 1,X get next char
 STA 2,Y save as lower limit two
 STA 3,Y and as upper limit two
 BRA mkst20 and go
mkst15 CMPB #6 is length six?
 BNE err no, then parameter error
 LDA 2,X get third char
 STA 1,Y save as upper limit one
 LDA 3,X get fourth char
 STA 2,Y save as lower limit two
 LDA 5,X get last char
 STA 3,Y save as upper limit two
mkst20 CLRB no error
return PULS Y,X,A,PC get old registers
err INCB error is true
 BRA return and return

usemess FCC /Usage: tr [-s] from [to]/
 FCB $0D

 EMOD end of module
trend EQU *
 END
```

CORRECTIONS

"The Computerized Shopping List" (April 1986, Page 216): Dennis Weide has written to give us a correction and a hint to his *Shoplist* program. The hint: The last entry in Table 1 on Page 217 explains that an OD Error will occur if STOP is omitted from the data section of the program. This is Line 2010 in the listing, but the line number will vary depending on how many items you enter. Also, it is important to keep in mind that the program takes a few minutes to compile the data, so don't get excited if there isn't an immediate response.

The correction: In some instances a BS might occur in Line 1300 if the program isn't used properly. To alleviate this situation, delete Line 421. The program will work as it should.

"A Peace Treaty for Computer Hackers and Couch Potatoes" (March 1986, Page 49): Bill Bernico has written to tell us there is an error in his program *TV Shows*. If you pick the Network News option, the word "magazine" appears. This is because the variable "Z$" was not defined. To correct the problem, add the following line to the program:

```
375 Z$="BR3BU4R2DG2DR2"
```

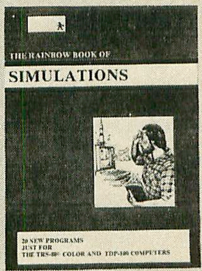
"The CoCo Zone" (April 1986, Page 26): There are no reported problems with the actual program *CoCo Zone*. There have been, however, numerous calls from readers who are having trouble creating a working copy of the game. RUNning the *CoCo Draw* program draws and saves the graphics screens, *Zone 0* through *Zone 9* to the tape or disk for you. The final, working game tape or disk **must** have these files in the following order: *Boot*, *Zone 0*, *Zone 1*,..., *Zone 9* and *CoCo Zone*. Then, CLOAD and RUN *Boot*, answer all prompts and you'll soon be ready to play the Adventure. Notice that *CoCo Draw* has nothing to do with the actual play of the game.

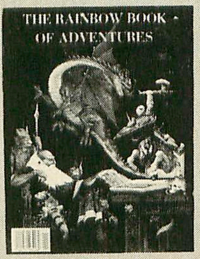
For quicker service, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type DATA at the CoCo SIG prompt and INFO at the Topic? prompt.

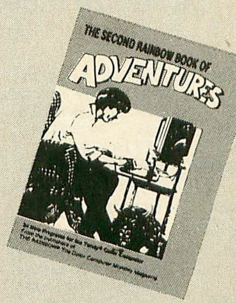
Recommended Reading for Your CoCo from . . .

The Rainbow Bookshelf

THE COMPLETE RAINBOW GUIDE TO
OS-9
By Dale L. Puckett and Peter Dibble


THE RAINBOW BOOK OF
SIMULATIONS
20 NEW PROGRAMS JUST FOR THE TRS-80 COLOR AND TDP-100 COMPUTERS





The Complete Rainbow Guide To OS-9

The book that demystifies the state-of-the-art operating system for the Tandy Color Computer. Authors Dale L. Puckett and Peter Dibble show you how to take advantage of OS-9's multi-tasking and multi-user features, and the capability of redirecting input and output commands at will. An easy-to-read, step-by-step guide packed with hints and tips, tutorials and free software in the form of program listings.

Book $19.95, Disk $31.00 (2 disks, book not included)

The Rainbow Book of Simulations

Features 20 award-winning entries from THE RAINBOW's first Simulation programming competition. You are the Commander-in-Chief of the Confederate Army during the Civil War, an air traffic controller at one of the nation's busiest airports, the owner of your own software business, a civil defense coordinator in charge of saving Rainbow City from a raging flood, a scientist conducting experiments on Mars . . . Your wits are on the line.

Book $9.95, Tape $9.95

The First Rainbow Book of Adventures

A collector's item containing 14 winning programs from THE RAINBOW's very first Adventure contest. Includes such favorites as *Sir Randolf of the Moors, Search for the Ruby Chalice, Deed of the York, Horror House, One Room, The Door* and *Dr. Avaloe.* Plus, hints and tips on solving Adventures.

Book $7.95, Tape $7.95

The Second Rainbow Book of Adventures

Our newest arrival features 24 of the most challenging Adventure games ever compiled. Meet the Beatles and battle the Blue Meanies, find a hidden fortune, or win the heart of a beautiful and mysterious princess. Experience the thrills and chills of the most rugged Adventurer without ever leaving your seat. *Ring Quest, Secret Agent Man, Dark Castle, Curse of Karos, Island* and more!

Book $13.95, Tape $13.95

Coming soon
The Rainbow Guide to Introductory Statistics
The Second Rainbow Book of Simulations

I want to start my own Rainbow Bookshelf!

For greater convenience, order RAINBOW Books and Tapes through the shopping area of the CoCo SIG of Delphi!

Please send me:

☐ The Rainbow Book of Simulations	$ 9.95	________
☐ Rainbow Simulations Tape	$ 9.95	________
☐ The Complete Rainbow Guide to OS-9 (book only)	$19.95	________
☐ Rainbow Guide to OS-9 Disk Package (2 disks)	$31.00	________
☐ The Rainbow Book of Adventures (first)	$ 7.95	________
☐ Rainbow Adventures Tape (first)	$ 7.95	________
☐ The Second Rainbow Book of Adventures	$13.95	________
☐ Second Rainbow Adventures Tape	$13.95	________
Add $1.50 per book Shipping and Handling in U.S.		________
Outside U.S., add $4.00 per book		________
Kentucky residents add 5% sales tax		________
(Allow 4 weeks for delivery)	Total	________

Name ________________________

Address ________________________

City ________________________

State ________________ ZIP ________

☐ Payment Enclosed, or ☐ Charge to:

☐ VISA ☐ MasterCard ☐ American Express

Account Number ________________________

Card Expiration Date ________________________

Signature ________________________

Mail to: Rainbow Bookshelf, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. To order by phone, call: (502) 228-4492.

Please note: The tapes and disks offered by The Rainbow Bookshelf are not stand-alone products. That is, they are intended to be an adjunct and complement to the books. Even if you buy the tape or disk, you will still need the appropriate book.

OS-9® is a registered trademark of the Microware Systems Corporation.

To order by phone (*credit card orders only*) call 1-800-847-0309, 8 a.m. to 5 p.m. EST. For other inquiries call 1-502-228-4492.

THESE FINE STORES CARRY THE RAINBOW

The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

ALABAMA

Birmingham	Jefferson News Co.
Brewton	McDowell Electronics
Florence	Anderson News Co.
Greenville	M & B Electronics
Madison	Madison Books
Montgomery	Trade 'N' Books

ALASKA

Fairbanks	Electronic World

ARIZONA

Phoenix	The Computer Shop
	Gemini Computers
	TRI-TEK Computers
Scottsdale	Data Concepts
Sierra Vista	Livingston's Books
Tucson	Anderson News Co.

ARKANSAS

Fayetteville	Vaughn Electronics/Radio Shack
Little Rock	Anderson News Co.

CALIFORNIA

Chula Vista	R & R Software
Citrus Heights	Software Plus
El Cajon	Radio Shack
Grass Valley	Advance Radio, Inc.
Half Moon Bay	Strawflower Electronics
Hesperia	Dessert Sound, Inc.
Hollywood	Levity Distributors
Lompoc	L&H Electronics Emporium
Los Angeles	E.D.C. Industries
	Polygon Co.
National City	Willy's Electronics
Palo Alto	Printers, Inc.
Sacramento	Tower Magazine
San Diego	The Computer Store
	Dimensional Software
	Disney's Electronics
	Radio Shack
Santa Rosa	Sawyer's News, Inc.
Southgate	Color Computing
Sunnyvale	Computer Literacy

COLORADO

Aurora	Aurora Newsstand
Colorado Springs	Hathaway's Magazines
Grand Junction	Colorado Periodical Distributing Co.
Westminster	Software City

CONNECTICUT

Danbury	Computer Serv. of Danbury

DELAWARE

Middletown	Delmar Co.
Milford	Milford News Stand
Wilmington	Normar, Inc.—The Smoke Shop

FLORIDA

Boca Raton	Software, Software, Inc.
Clearwater	Soenen & Wilmoth Books
Cocoa	The Open Door
Davie	Software Plus More
Ft. Lauderdale	Electronics Engineers
	Mike's Electronics Distributor
Jacksonville	Deano's TV
	The Book Nook
	Book Town
Melbourne	City Newsstand
	The Little Store
North Miami Beach	Almar Bookstore
Orlando	Book Mania
Panama City	Boyd-Ebert Corp.
Pensacola	Anderson News Co.
Pinellas Park	Wolf's Newsstand
Sarasota	Family Computers
South Pasadena	Poling Place
Stuart	Cotronics, Inc.
Sunrise	Sunny's at Sunset, Inc.
Tallahassee	Anderson News Co.
Tampa	Fine Print Bookstore
	Sound Trader & Computer Center
Titusville	Computrac

GEORGIA

Bremen	Bremen Electronics/Radio Shack
Columbus	Muscogee News Co.
Cummings	Kent Radio Shack
Jesup	Kannon Music
	Radio Shack
Marietta	Act One Video
St. Simons Island	Radio Shack
Toccoa	Martin Music Radio Shack

IDAHO

Blackfoot	F/M Systems Electronics
Moscow	Johnson News Agency

ILLINOIS

Aurora	Kroch's & Brentano's
Belleville	Software or Systems
Champaign	Book Market
Chicago	B. Dalton Booksellers
	N. Walbash St.
	West Jackson St.
	Bob's in Newtown
	Bob's News Emporium
	Bob's Rogers Park
	Book Market
	East Cedar
	North Cicero
	West Diversey
	E.B. Garcia & Associates
	Kroch's & Brentano's
	South Walbash
	West Jackson
	516 N. Michigan
	835 N. Michigan
	Parkway Drugs
	Parkwest Books
	Sandmeyer's Bookstore
	Univ. of Chicago Bookstore
	Univ. of Illinois Bookstore
	Videomat, Inc.
Chillicothe	Book Emporium
Danville	Book Market
Decatur	Book Emporium
	K-Mart Plaza
	Northgate Mall
DeKalb	Appletree Computers
East Moline	Book Emporium
Evanston	Chicago-Main News
Geneseo	B & J Supply
Kewanee	Book Emporium
Lisle	Book Nook
Newton	Bill's TV Radio Shack
Oak Brook	Kroch's & Brentano's
Oak Park	Kroch's & Brentano's
Paris	Book Emporium
Peoria	Book Emporium
	Sheridan Village
	Westlake Shopping Center
	Book Market
	Illinois News Service
Schaumberg	Kroch's & Brentano's
Skokie	Kroch's & Brentano's
Springfield	Book Emporium
	Sangamon Center North
	Town & Country Shopping Ctr.
Sunnyland	Book Emporium
West Frankfort	Paper Place
Wheeling	North Shore Distributors

INDIANA

Berne	White Cottage Electronics
Columbus	Micro Computer Systems, Inc.
Garrett	Finn News Agency, Inc.
Greenwood	The Computer Experience
Highland	Computer Health Consultants
Indianapolis	Bookland, Inc.
	Indiana News
Jasper	Elex Mart
Madison	Arco Office Supplies
Martinsville	Radio Shack
Walbash	Mitting's Electronics

IOWA

Bettendorf	Cosmos Computers
Davenport	Interstate Book Store

KANSAS

Topeka	Palmer News, Inc.
	Town Crier of Topeka, Inc.
Wichita	Amateur Radio Equipment Co.
	Lloyd's Radio

KENTUCKY

Danville	Boyle Electronics
Georgetown	Goodwin Electronics
Hopkinsville	Hobby Shop
Louisville	The Computer Store
Paducah	Radio Shack
Paintsville	R-Kat Electronics
Pikeville	Gus-Stan Enterprises
Princeton	Miller Electronics

LOUISIANA

Baton Rouge	Acme Book Co.
Crowley	Acadiana Newsstand
Gretna	Computer Supply Store

MAINE

Brockton	Voyager Bookstore
Waterboro	Radio Shack

MARYLAND

Silver Spring	Layhill Newsstand

MASSACHUSETTS

Brockton	Voyager Bookstore
Cambridge	Ninis Corner, Inc.
	Out Of Town News
Fitchburg	Corners Book Shop
Ipswich	Ipswich News
Littleton	Computer Plus
Lynn	North Shore News Co.
Quincy	Soft Ware House
Rehaboth	Arel Computer & Electronics

MICHIGAN

Allen Park	Book Nook, Inc.
Ann Arbor	Community News Center
Brooklyn	Weatherwax Radio Shack
Durand	Robbins Electronics
Greenville	Robbins Electronics
Harrison	Harrison Radio Shack
Lowell	Curt's Sound & Home Arcade Center
Mt. Clemens	Key Book Shop
	Michigan Radio
Muskegon	The Eight Bit Corner
Owosso	C/C Computer Systems
Perry	Perry Computers
	Perry Oil & Gas
Pontiac	Computer Shack
Roseville	New Horizons
Royal Oak	Software City
St. Johns	Clinton Electronics
Sterling Heights	Sterling Book Center
Tecumseh	White Electronics
Wyoming	Gerry's Book Co.

MINNESOTA

Minneapolis	Read-More News
Willmar	The Photo Shop

MISSISSIPPI

Grenada	Stereo Store of Grenada, Inc.
Starkville	Stonehenge Computer Software Center

MISSOURI

Farmington	Ray's TV & Radio Shack
Kirksville	T&R Electronics
Moberly	Audio Hut
St. Louis	Book Emporium
	Computer Xchange
	Softwaire Centre
University City	Final Edition

MONTANA

Whitefish	Consumer Electronics of Whitefish

NEBRASKA

Lincoln	Hobby Town
Omaha	Computers & Components

NEVADA

Battle Mountain	Stewart's Radio Shack
Las Vegas	Hurley Electronics

NEW HAMPSHIRE

Portsmouth	Portsmouth Computers
West Lebanon	Verham News Corp.

NEW JERSEY

Cedar Knolls	Village Computer & Software
Cherry Hill	Software City

Clinton	Micro World II
Lawrenceville	Micro Con Software Center
Linwood	Software City
Marmora	Outpost Radio Shack
Montvale	Software City
Pennsville	Dave's Elect. Radio Shack
River Edge	Software City
Rockaway	Software Station
Summit	Software City
Villas	Art's Electronics

NEW MEXICO

Alamogordo	New Horizons Computer Systems
Albuquerque	Desert Moon Distributors
	Page One Newsstand
	Salt of the Earth

NEW YORK

Brockport	Lift Bridge Book Shop, Inc.
Elmira Heights	Southern Tier News Co., Inc.
Fairport	Software City
Fredonia	On Line: Computer Access Center
Hudson Falls	G.A. West & Co.
Johnson City	Unicorn Electronics
New York	Barnes & Noble—Sales Annex
	Coliseum Books
	Eastern Newsstand
	Grand Central Station, Track 37
	200 Park Ave., (Pan Am #1)
	55 Water Street
	World Trade Center #2
	First Stop News
	Idle Hours Bookstore
	International Smoke Shop
	Jonil Smoke
	Penn Book
	Software City
	State News
	Usercom Systems, Inc.
	Walden Books
	World Wide Media Services
N. White Plains	Software City
Rochester	Village Green
	World Wide News
Woodhaven	Spectrum Projects

NORTH CAROLINA

Aberdeen	King Electronics
	Radio Shack
Cary	News Center in Cary Village
Charlotte	Newsstand Int'l
	Papers & Paperback
Havlock	Computer Concerns
Hickory	C² Books & Comics
Marion	Boomers Rhythm Center

NORTH DAKOTA

Fargo	Computer Associates

OHIO

Blanchester	JR Computer Control
Canton	Little Professor Book Center
Chardon	Thrasher Radio & TV
Coshocton	Utopia Software
Dayton	Wilke News
Fairborn	News-Readers
Kent	The News Shop
Kenton	T.W. Hogan & Associates
Lakewood	Lakewood International News
Lima	Brunner News Agency
	Edu-Caterers
Mayfield Heights	Software City
Miamisburg	Wilke News
Mount Orab	Mount Orab Radio Shack
Rocky River	Programs Unlimited
Toledo	Leo's Book & Wine Shop
Xenia	Fine Print Books

OKLAHOMA

Hobart	Shortgrass Electronics
Oklahoma City	Merit Micro Software
Tulsa	Steve's Book Store

OREGON

Portland	Fifth Ave. News

PENNSYLVANIA

Allison Park	Software City
Altoona	Newborn Enterprises
Brookville	Larry's Stereo Shop
Exton	Software City
Harrisburg	Harrisburg News Co.
Malvern	Personal Software
Philadelphia	City Software Center
	Newsy
Phoenixville	Stevens Radio Shack
Pittsburgh	All-Pro Souveniers
Pleasant Hills	Pitt Computer & Software
Temple	Software Corner
Tunkhannock	The Donna Comm. Co.
Wind Gap	Micro World
York	The Computer Center of York

RHODE ISLAND

Warwick	Software Connection

SOUTH CAROLINA

Charleston Hts.	Software Haus, Inc.
Gaffney	Gaffney Book Store
Greenville	Palmetto News Co.
Hilton Head	Megatron Corporation
Spartanburg	Software City
Union	Fleming's Electronics

TENNESSEE

Chattanooga	Anderson News Co.
	Guild Books & Periodicals
Dickson	Highland Electronics
Knoxville	Anderson News Co.
	First Byte Computer Co.
Memphis	Computer Center
	Software, Inc.
Nashville	Mosko's Book Store
Smyrna	Delker Electronics

TEXAS

Elgin	The Homing Pigeon
Ft. Worth	Software Terminal
Houston	MicroSolutions
Mercedes	Cool TV
Orange	Northway Books & News
San Antonio	CoCo Nuts

UTAH

Murray	Deseret Book

VIRGINIA

Gafton	Electronics Marketing
Norfolk	I-O Computers
Richmond	Software City

WASHINGTON

Mount Lake Terrace	Emerald Computer Services
Newport	Nantronics
Seattle	Adams News Co., Inc.
Tacoma	B & I Magazines & Books
	Nybbles 'N Bytes

WEST VIRGINIA

Huntington	Nick's News
Logan	Stan's Electronics & Radio Shack
Madison	Communications, LTD
Parkersburg	Valley News Service

WISCONSIN

Appleton	Badger Periodicals
Cudahy	Cudahy News & Hobby
Ladysmith	Electronics, Etc.
Milwaukee	Book Tree
	Booked Solid
	Booked Solid II
	Harvey Schwartz Bookshop
	Univ. of Wisconsin Bookshop
Sturgeon Bay	Door County Electronics

WYOMING

Casper	The Computer Store
Worland	Price Electronics

ARGENTINA

Cordoba	Informatica Y Telecomunicaciones

AUSTRALIA:

Kingsford	Paris Radio Electronics

CANADA:
ALBERTA

Banff	Banff Radio Shack
Blairmore	L & K Sports & Music
Bonnyville	Paul Tercier
Brooks	Double "D" A.S.C. Radio Shack
Calgary	Billy's News
Drayton Valley	Langard Electronics
Edmonton	CMD Micro
	Kelly Software Distributors
Edson	Radio Shack
Fairview	D.N.R. Furniture & TV
Fox Creek	Fox City Color & Sound A.S.C. Radio Shack
Ft. Saskatoon	Ft. Mall Radio Shack
Grande Cache	The Stereo Hut
Grande Centre	The Book Nook
Hinton	Jim Cooper
Innisfail	L & S Stereo
Leduc	Radio Shack Associated Stores
Lethbridge	Datatron
Lloydminster	Lloyd Radio Shack
Okotoks	Okotoks Radio Shack
Peace River	Radio Shack Associated Stores
	Tavener Software
St. Paul	Walter's Electronics
Stettler	Stettler Radio Shack
Strathmore	Wheatland Electronics
Taber	Pynewood Sight & Sound
Westlock	Westlock Stereo
Wetaskiwin	Radio Shack

BRITISH COLUMBIA

Burnaby	Compulit
Burns Lake	VT. Video Works
Campbell River	TRS Electronics
Chilliwack	Charles Parker
Coortenay	Rick's Music & Stereo
Dawson Creek	Bell Radio & TV
Golden	Taks Home Furnishings
Langley	Langley Radio Shack
N. Vancouver	Microwest Distributors
Parksville	Parksville TV
Penticton	D.J.'s
	Four Corner Grocery
Salmon Arm	Matrix Computing
Sidney	Sidney Electronics
Smithers	Wall's Home Furniture
100 Mile House	Tip Top Radio & TV

MANITOBA

Altona	L.A. Wiebr Ltd.
Lundar	Goranson Elec.
Morden	Central Sound
The Pas	Jodi's Sight & Sound
Selkirk	G.L. Enns Elec.
Virden	Archer Enterprises
Winnipeg	J & J Electronics Ltd.

NEW BRUNSWICK

Moncton	Jeffries Enterprises
Sussex	Dewitt Elec.

NEWFOUNDLAND

Botwood	Seaport Elec.
Carbonear	Slade Realties

NOVA SCOTIA

Halifax	Atlantic News

ONTARIO

Aurora	Compu Vision
Concord	Ingram Software
Exceter	J. Macleane & Sons
Hamilton	Dataman
Hanover	Modern Appliance Centre
Huntsville	Huntsville Elec.
Kenora	Donny "B"
Kingston	T.M. Computers
Listowel	Modern Appliance Centre
South River	Max TV
	Dennis TV

QUEBEC

LaSalle	Messageries de Presse Benjamin Enr.
Pont. Rouge	Boutique Bruno Laroche

SASKATCHEWAN

Assiniboia	Telstar News
Estevan	Kotyk Electronics
Moose Jaw	D&S Computer Place
Nipiwan	Cornerstone Sound
Regina	Regina CoCo Club
	Software Supermarket
Saskatoon	Everybody's Software Library
Shellbrooke	Gec. Laberge Radio Shack
Tisdale	Paul's Service
Unity	Grant's House of Sound

YUKON

Whitehorse	H & O Holdings

PUERTO RICO

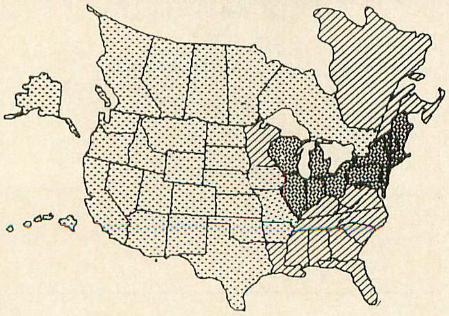
San Juan	Software City

Also available at all B. Dalton Booksellers, and selected Coles Bookstores, Waldenbooks, Pickwick Books, Encore Books, Barnes & Noble, Little Professors, Tower Book & Records, Kroch's & Brentano's, and Community Newscenters.

ADVERTISER'S INDEX

We encourage you to patronize our advertisers — all of whom support the Tandy Color Computer. We will appreciate your mentioning **THE RAINBOW** when you contact these firms.

Ark Royal Games 157
B5 Software 219
Bangert Software Systems 202
Cer-Comp 170, 171
Challenger 158
Cinsoft 72
CNR Engineering 103
CoCo Trend 167
CoCo Warehouse 186
Cognitec 13
Colorware 21, 22, 23, 25
Computer Center 35
Computer Friends 16
Computer Island 88, 89
Computer Plus 3
Computerware 47
Computize, Inc. 225
Cosmos Computer Services Inc.
.... 55
Cozy Software 173
D & A Research 144
Dayton Associates of
W. R. Hall, Inc. 152
Derringer Software 94, 95
Diecom 191
Disto .... IBC
Dorsett Educational Systems,
Inc. 147
Dragon User 38
DYNACALC 205
Dynamic Electronics, Inc. 159
E.D.C. Industries 203
Federal Hill Software 164
Group Technology 151
H.D.R. Software 120
Hard Drive Specialists .... IFC
Hawkes Research Services 174
hi-tech 121
HJL div. of Touchstone
Technology, Inc. 162
Horizon 10
Howard Medical 34, 226
Intercomp Sound 185
J & M Systems .... BC
J & R Electronics 87
Johnson, D.P. 209
Kelly Software Distributors ... 78
Logicware 53
Mark Data Products 134, 135
Metric Industries 210
MichTron 77
Micro Works, The 183
Microcom Software 17
Microtech Consultants Inc. 29
MicroWorld 73
Mix, Tom Software 14
Moreton Bay 96
Novasoft 15
Other Guys Software, The 131
Owl-Ware 80, 81
PCM 100
PD Software 181
Perry Computers 178
Plan-Net Forms 79
Polygon Co. 73
Preble's Programs, Dr. 148
Prickly-Pear Software 69
PXE Computing 7
Radio Shack 41, 43, 138, 139
Rainbow Adventure Book II 161
Rainbow Binder 116
Rainbow Bookshelf 221
Rainbow Gift Subscription 99
Rainbow On Tape 180
REM Industries 186
Robotic Microsystems 169
Saguaro Software 119
Selected Software 85
Software House, The 143
Software Support, Inc. 128, 129
Soistman, Jim 48
Spectrogram 67
Spectrosystems 187
Spectrum Projects Inc.
.... 105, 106, 107, 109, 110, 111
Speech Systems 56, 57, 58, 59, 60, 61
Sugar Software 206, 207
Sunrise Software 70
T & D Software 113
T & M Enterprises 30
TCE 31
Tepco 177
Tothian Software Inc. 190
True Data Products 192, 193
VCR 33
Wasatchware 120
Woodstown Electronics 93
Workbase Data Systems 168
York 10 121
Zytek LTD. 188



░ **Call:**
Shackleford, Nolan, Davis, Gregg and Associates
Cindy Shackleford, president
Shirley Duranseau
Advertising Representative
12110 Meridian South, Suite 5
P.O. Box 73-578
Puyallup, WA 98373-0578
(206) 848-7766

▨ **Call:**
Kim Vincent
Advertising Representative
The Falsoft Building
9509 U.S. Highway 42
P.O. Box 385
Prospect, KY 40059
(502) 228-4492

▓ **Call:**
Jack Garland
Garland Associates, Inc.
10 Industrial Park Road
Hingham, MA 02043
(617) 749-5852

ARE YOU LOOKING FOR A HI-RES GRAPHIC SCREEN PRINT DUMP?

HARDCOPY - Hardcopy is more than just a screen print dump, compare these features with any other graphic dump program on the market:

- Full GRAPHICOM/GRAPHICOM PART II compatibility! Loads STANDARD 6K images, GRAPHICOM pictures, and COCO MAX pictures too!
- BLACK & WHITE or GREY SCALE printing. In GREY SCALE printing, colors are printed as user definable patterns. Supports hi-res in all 4 GRAPHICOM display modes!
- **1x, 2x, 3x PRINTOUTS** - Three menu options are reserved for the most frequently used printout sizes; 1x (quarter page), 2x (half page), and 3x (full page).
- **GRAPHIC LABELS** - The label printing option allows the user to create custom mailing or disk labels with professional looking results.
- **GREETING CARDS** - The greeting card option allows the user to custom design greeting cards using both text and graphics.
- **GIANT POSTERS** - The poster option provides the user with a means of reproducing a hi-res graphic to a multi-sheet poster.
- **SPECIAL EFFECTS** - The special effects option allows the user to directly control the printing directives; ROTATION, X/Y SIZE, X/Y FLIP, X/Y GRID, X/Y FILL, TAB, WINDOW, POS/NEG IMAGE, and more!
- **USER CALL** - Have an application that **HARDCOPY** doesn't quite match? **HARDCOPY** routines can be added to EXTENDED BASIC through the USR command!

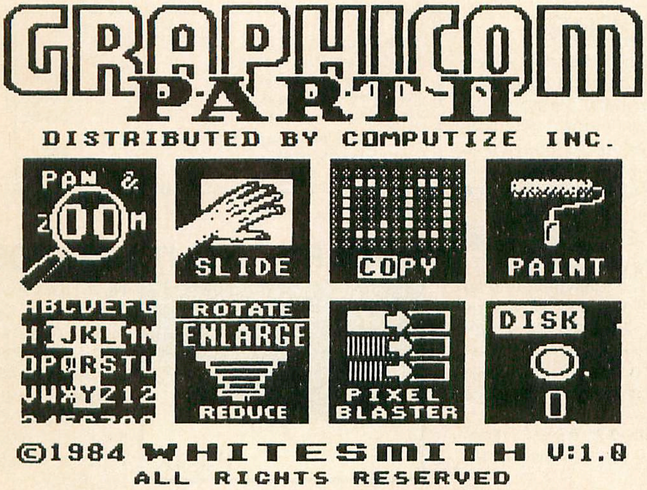
HARDCOPY* requires a 64K Color Computer or Color Computer II, and at least one disk drive. It supports 1 to 4 disk drives, keyboard or joystick input. Please specify **printer** and **cat. number** when ordering.

IDS 480/560-G	Cat. No. 170WD	Gemini 10X	Cat. No. 174WD
Oki 82A (Okigraph)	Cat. No. 179WD	Gemini SG-10/15	Cat. No. 178WD
Okidata 92	Cat. No. 171WD	DMP-105	Cat. No. 183WD
Epson LX-80	Cat. No. 173WD	DMP-110	Cat. No. 180WD
Epson MX-80	Cat. No. 172WD	DMP-120	Cat. No. 176WD
Epson RX-80	Cat. No. 173WD	DMP-130	Cat. No. 180WD
Epson FX-80	Cat. No. 173WD	DMP-200	Cat. No. 175WD
Riteman PLUS	Cat. No. 177WD	CGP-220	Cat. No. 181WD

* Due to hardware differences, some features may function differently on certain printers.

HARDCOPY
THE ULTIMATE PRINTER UTILITY
NEW DMP-105 VERSION
©1984 WHITESMITH V:1.0
ALL RIGHTS RESERVED

HARDCOPY PRINT UTILITY $29.95



GRAPHICOM PART II $24.95

YOU COULD SPEND $100.00 OR MORE TO UPGRADE YOUR GRAPHICS SYSTEM, JUST BUY...

Eclipse (Zoom)	$19.95/Moreton Bay		
Super Paint (Paint)	$19.95/Michtron	Text Master (Hi-Res Text)	$29.95/Data Man
Shrinx (Reducer)	$21.95/Grafx	G.C.U. (Disk Utilities)	$19.95 Computize

OR YOU COULD SPEND $24.95 FOR GRAPHICOM PART II AND GET:

a video processing package that provides many functions that are missing in Graphicom. Here are just a few of the features provided by Graphicom Part II:

ENLARGE/REDUCE/ROTATE
Enlarge or reduce any portion of a graphic screen, just like a photographic enlarger! Rotate by any degree or fraction of a degree around any point on the screen.

PAINT
Paint or "fill-in" any irregular area on the screen! More than 50 different colored patterns available. Additional paint patterns may be user-defined.

PAN & ZOOM
"Zoom in" x2, x4, or x8 on any portion of the screen to do fine pixel work. Allows editing of Graphicom character sets with ease!

TYPESETTER & FONT EDITOR
Add text in 16 different sizes, also supports user definable foreground & background colors. Design & Edit characters for use in the typesetter.

PIXEL BLASTER
Allows the user to easily substitute or remove colors. Widen lines, swap BLUE & RED without effecting BLACK & WHITE, etc.

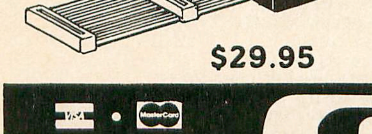
GRAPHICOM PART II DOES NOT REQUIRE GRAPHICOM TO RUN!

Graphicom Part II requires a 64K extended disk basic system, and supports 1 to 4 disk drives, keyboard or joystick (analog or switch type) input. It will load and save both **Standard BIN** files and **Graphicom** screens. All functions support color or Hi-Res operation, as well as the 4 screen display modes.

NEW LOW PRICE! GRAPHICOM DIGITIZER $159.00

Input directly into Graphicom for easy enhancements, manipulation, stamping, and storage. Accepts composite video signal in (1.0v p-p) from video camera, VCR, video disc player, another computer, or other compatible video sources. View "off air" or "VCR" digitized video at close to real-time. "Snapshot" video frames to the digitizer's internal memory. No slow, data serial manipulation.
Use with your multi-pak, "Y" box, or a "Y" cable ("Y" cable available at $19.95) Video is input via a "BNC" connector. External controls for HORIZONTAL POSITION, VERTICAL POSITION, HORIZONTAL WIDTH, BRIGHTNESS, and CONTRAST (FUZZ) settings.
Don't be fooled by imitations...this is the GRAPHICOM VIDEO DIGITIZER . . . the **only** digitizer that "DIRECTLY" inputs into Graphicom
REQUIRES 64K COCO, 1 DISK DRIVE, AND 2 ANALOG JOYSTICKS. FREE GRAPHICOM PROGRAM, PICTURE DISK, AND GRAPHICOM UTILITY SUPPLIED WITH PURCHASE OF VIDEO DIGITIZER (A $50 VALUE).

"Y" BOX



$29.95

GRAPHICOM $24.95

Catalog No. 111GD
Simply stated - One of the finest graphic programs written for the Color Computer!
FEATURES:
- S-U-P-E-R U-S-E-R F-R-I-E-N-D-L-Y !
- Supports 4 Hi-Res display modes
- 4 page animation mode
- Color Palette with over 15 color patterns for use with Hi-Res artifact
- Send/Receive pictures over modem
- Supplied utility allows capturing Hi-Res screens from most COCO arcade games
- Multiple Hi-Res character fonts (user redefinable)
- Supplied utility for transferring Graphicom screens to Basic or other M/L programs.
- Supplied utility for loading screens from Basic or other sources
- Built in Hi-Res SCREEN PRINT (compatible with EPSON, C-ITOH, GEMINI-10, OKI, plus Radio Shack's LP-VII, LP-VIII, DMP-100, DMP-200, and GCP-115 printers) from 110 to 9600 baud
- SEND/RECEIVE slow-scan television
- Many additional features, operating hints, hardware mod's and suggestions, etc.

REQUIRES 64K COCO, 1 DISK DRIVE, AND 2 ANALOG JOYSTICKS

NEW MASTER KEY II

New Improved Version! A hardware product that takes control of any program regardless of protection. Now use with RS Multi-pak, "Y" cable or **optional** extender cable. Captures register contants as they were when Master Key II was engaged. Complete disassembler, memory save, and much more. Requires some familiarity with Assembly Language.
ROM PAK Cat. No. 160HR . . . . . . $ 99.95
Cat. No. 161HR With Ext. Cable . . . $109.95

PICTURE DISK SETS

Available from COMPUTIZE
4C - Artifact color palette
5C - Large character sets (from Derringer Software)
6C - Same as 5C but set up as stamp set
Picture Disk Set 1 . . . . $19.95
7 - Miscellaneous Art Set #1
8 - Miscellaneous Art Set #2
9 - Miscellaneous Ads and Examples
Picture Disk Set 2 . . . . $19.95
10 - Miscellaneous Fonts
11C - Artifact color palette type fonts
Picture Disk Set 3 . . . . $14.95
12C - Art demo from WHITESMITH
13C - GRAPHICOM PART II function demo
Picture Disk Set 4 . . . . $14.95

GC II FONT DISKS

Each disk contains 10 or more fonts. (4 versions of each font, one for each display mode).
14C - GCII Fonts Disk #1
15C - GCII Fonts Disk #2
16C - GCII Fonts Disk #3
GRAPHICOM PART II Font Disks . . . $19.95

TRIPLE TRANSFER UTILITY ©

Transfer contents of disk to tape • Transfer contents of tape to disk • Automatically relocates cassette programs that conflict with the disk operating system • Displays machine language program addresses • Copies ASCII, Basic, & Machine Language Programs • All contained in 1 menu driven program!
REQUIRES 32K CC EXT.
Cassette $19.95 . . Cat. No. 105CT
Disk $24.95 . . . . Cat. No. 105CD

SUPER BACK-UP UTILITY ©

. . . WITH S.B.U. FROM COMPUTIZE — YOU'LL NEVER NEED ANOTHER BACK-UP UTILITY FOR YOUR COCO!!! SUPER BACK-UP UTILITY WILL PERFORM **ALL** OF THE FOLLOWING FUNCTIONS:

1. **TAPE TO TAPE** (Regardless of most protection schemes!)
2. **TAPE TO DISK** (Move Cassette programs to Disk!)
3. **AUTO RELOCATE** (For those Cassette programs that conflict with Disk operating systems.)
4. **DISK TO TAPE** (Place Disk programs onto Cassette)
5. **DISK TO DISK** (Our powerful Split-N-Image Program, Copies regardless of most protection schemes!)

- **MENU DRIVEN**
- **REQUIRES 32K EXTENDED COCO**
- **REQUIRES 1 OR 2 DRIVES**
- **ALL MACHINE LANGUAGE!!!**

COMPARE WITH OTHER INDIVIDUAL PROGRAMS COSTING IN EXCESS OF $100.00
DISK $49.95 . . . . Cat. No. 107CD

SPIT-N-IMAGE ©

M/L Disk Back-Up Utility
There is no need to suffer the heartbreak of crashed disks any longer. Spit-N-Image will create a mirror image of your valuable disk programs which do not respond to normal back-up functions. Will also initialize and back-up in one pass. Data processing experts always insist on having a back-up — it's good a practice.
REQUIRES 32K CC
DISK $34.95 . . . . Cat. No. 101CD

Check or M.O.
Add $3.00
shipping

Computize INC.

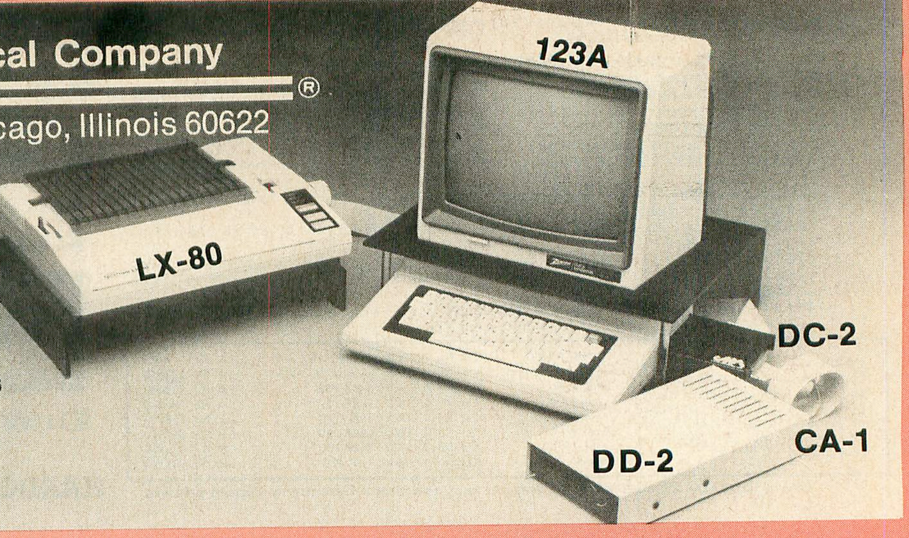
(215) 946-7260 P.O. BOX 207 • LANGHORNE, PA 19047

PA residents
add 6%
sales tax

Howard Medical Company®

1690 N. Elston Chicago, Illinois 60622
(312) 278-1440

WE ACCEPT **VISA**
MasterCard
American Express
COD or Checks
School P.O.'s



New Dual Mode EPSON

The new Epson LX-80 offers printing flexibility in two modes: one mode allows you to print in a quick (100 cps) dot-matrix style for programming and graphics, and the Near Letter Quality mode (16 cps) produces precise (240 dots per inch), beautiful type for correspondence, reports, and similar purposes. The LX-80 offers 160 different type-style combinations, including Pica, Elite, Enlarged, Emphasized, Condensed, Subscripts and Superscripts, and type-styles can be selected quickly from the top control panel or from program control. Comes standard in friction feed; tractor option is also available.

LX-P package includes an LX-80, a serial interface, a Color Computer to Epson cable, and Printer Tutorial that teaches you how to program the different type styles ($29.95 value).

LX-P: LX-80 package $317 ($7 shpg)

ET-1 tractor option for LX-80. $29.50.

SF-1 Single-sheet feeder for the LX-80. $145 ($7 shpg)

Epson	RX-80 FT	repack	$207.
Epson	LX-80 New		$249.
Botek	Serial to parallel converter		$68.45
Howard	CoCo to Epson cable		$25.

DM-1	Disk mailer holds from one to five diskettes 200 lb. cardboard construction 25 mailers/box	**$20.**

MONITORS

123 Zenith 12" Green Screen, 640 dots x 200 dots resolution, 15 MHz band width. **$114** ($7 shpg)

123A Zenith 12" Green Screen Special, $67.50 ($7 shpg) 80 Column non glare

122 Zenith 12" Amber Screen, 640 dots x 200 dots resolution, 15 MHz band width. **$117** (7 shpg)

141 Roland 13" Color Monitor with speaker, 270 dots x 200 dots resolution, 4MHz band width **$247** ($12 shpg)

All monitors require video controller.
Reverse video free with monitor order.

MEMORY

64K Upgrades—1 Year Warranty

64-E1 for E Boards with complete instructions. Remove old chips and replace with preassembled package—no soldering or trace cuts. **$28.45** ($2 shpg)

64-F1 for F Boards. No soldering needed. Capacitor leads must be cut. **$24.45** ($2 shpg)

64-2 for COCO 2. Kit requires one solder point, no trace cuts. **$24.45** ($2 shpg)

CONTROLLERS

New Controller from J&M: Has switch that allows either JDOS or RS DOS to be the disk operating system; eliminates software compatibility problems, while preserving the advantages of J&M's gold contacts and data separator. Also added to the DC-2 is a parallel port, which means a serial interface is no longer needed to make a parallel printer (like the Epson) work.

DC-2 Disk Controller with JDOS. **$128** ($2 shpg)

RS-1: RS DOS ROM Chip. $20.00 ($2 shpg)

DC-1 Disk Controller reads and writes to 35 and 40 track single and double-sided drives for *all* models of the Color Computer w/ JDOS. **$128** ($2 shpg)

VC-1 Video Interface mounts inside Color Computer by piggy-backing IC on top of interface—no soldering, no trace cuts. All models give composite video & sound. **$24.45** ($2 shpg)

VC-2 for COCO 2—mono only. **$26.45** ($2 shpg)

VC-3 for COCO 2—both color or monochrome **$39.45** ($2 shpg)

VC-4 for new Color Computer (no sockets, chips are soldered to mother board). Attaches with spring-loaded clips. Color or mono. **$39.45** ($2 shpg)

EPSON AND J&M

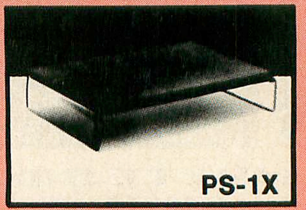
The EJ-P Package

The Epson LX-80 Printer teamed with our new J&M DC-2 Controller gives you top printing capabilities *plus* built-in switch gives JDOS or Radio Shack DOS so all software can run on your Color Computer. Package includes: Epson LX-80 Printer with ET-1 tractor; DC-2 controller; parallel Color Computers to J&M cable; Epson Printer Tutorial ($29.95 value).

Complete EJ-P package $425.00 ($7 shpg)

DD-2	Double sided 360K disk with ½ height case & heavy duty power supply	**$188.**
CA-1	Disk drive cable	**$24.50**
CA-2	Two drive cable	**$29.50**
DE-1	Disk enclosure ½ height with power supply	**$58.**

HOWARD QUALITY STANDS



New TS-1X Monitor Stand: Designer-beautiful stand with clear corner posts, easy side access to ROM port, reset and on/off buttons. **$39.50** ($3 shpg)

TS-1: Standard 13" monitor stand for the original Color Computer. Specify black, ivory or clear. 15"×11"×4". **$29.50** ($3 shpg)

TS-2: Same as above for the COCO 2. **$29.50** ($3 shpg)

PS-1X Printer Stand features new noise-suppressing foam top and cork base. 15"×11"×2½". **$24.95** ($3 shpg)

GUARANTEE

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatibility. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back, (less shipping).

Hours: 8:00-4:00 Mon.-Fri.
10:00-3:00 Sat.

Software system requirements: CoCo with 1 disk, 32K RAM, 80-column printer
Add $2 for shipping.

ORDERS
(800)
443-
1444

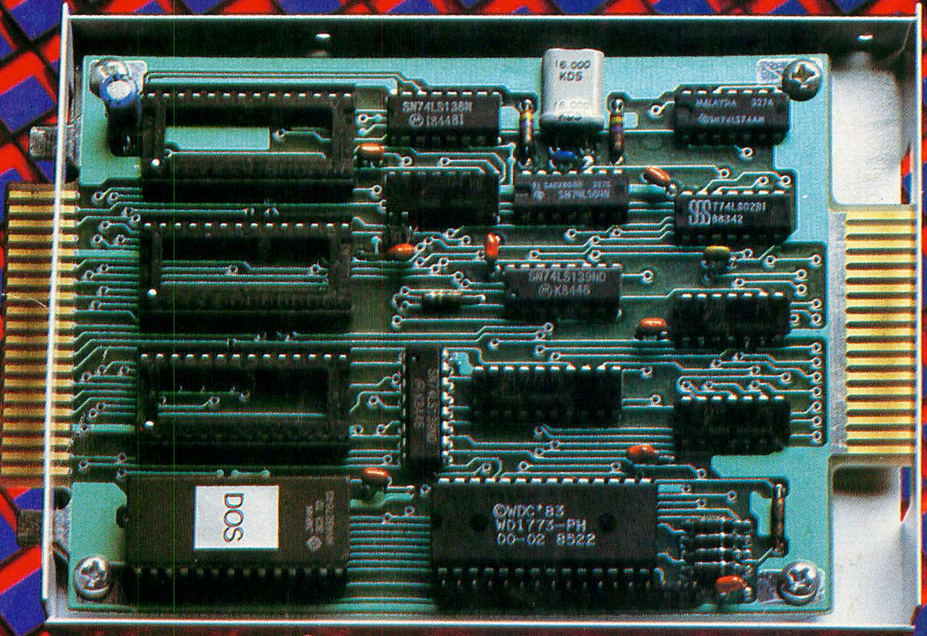
SOFTWARE CORNER

PAYROL/BAS 39.95	Automatically calculates FED & FICA and 3 additional user defined deductions. TABLES ARE ALREADY ENTERED.
LEDGER free with PAYROL/BAS	Prints checkbook with up to 30 user definable ledger numbers a $39/VALUE
	WITH PAYROL/BAS YOU WILL ALSO WANT
STATE TAX 39.95	Automatically calculates state withholding including graduated taxes. TABLES ALREADY ENTERED
941 29.95	Prints totals by quarter per employee Ideal for Federal 941 and state unemployment
CHECKS	500 pin-feed checks specify blue green or brown $57.25
VIP LIBRARY $125	Softlaw's integrated package includes VIP Write, terminal, Database, Speller and CALC
SAP-II 19.95	Stock analysis program organizes your portfolio and give specific sell & stop-loss points
BPA-1 19.95	Chart your blood pressure from daily readings taken in the comfort of your home.

DISTO

SUPER CONTROLLER

ONLY $99.95 US.



FEATURES:

- Gold contacts on all connectors.
- Shielded metal box for low RF noise.
- 4 28-pin sockets for software expandability.
- Uses 2764 or 27128 EPROMS.
- EPROMS are software selectable.
- Internal Mini-Expansion Bus interface for;
  - 80 Columns
  - Real Time Clock and/or
  - Parallel Printer or
  - EPROM Programmer or
  - User Projects.
- Complete Radio Shack compatibility.
- New technology, no adjustments needed.
- Very Accurate 16mhz High Speed Master Clock.
- Needs +5 volts only, works on all COCOs or COCO IIs.

EXPANSION ADD-ONS:

There are currently four add-ons available from DISTO for this controller;

PPRINT

The first is a Centronics Compatible Parallel Printer adapter. This adapter will allow you to connect a Centronics compatible printer directly to your controller, leaving the serial port of your computer free for your modem. Printer driver software included.

RTIME

The second is a Real Time Clock. This is a clock chip that will keep the proper time, date and year. A small battery keeps the time when the Computer is off, retreive and set the time by using simple Basic POKES. Also available with the Real Time Clock is the optional Centronics Compatible Parallel Printer adapter. Software to set the clock and printer driver included.

MPROM

The third is a Mini EPROM Programmer. Yes, a low cost programmer that attaches to the disk controller. A must for the DISTO Super Controller. Program those often used utilities into EPROM and plug them directly into your controller. Will program 2764's or 27128's, a perfect mate for the DISTO Super Controller.

DISPLAY80

The fourth is a real knock-out. This is a three in one card. It's major function is to add an 80* 24 display to your computer. A feature packed package also includes RTIME and PPRINT. All in one neat package that fits inside the controller. OS9 software available. Call for more information.

CREDITS:

The DISTO Super Controller, add-ons and all its documentation are conceived and designed by Tony Distefano. The DISTO Super Controller and add-ons are manufactured and distributed by; C.R.C. COMPUTER INC.
10802 Lajeunesse, Montréal, Québec, Canada H3L 2E8 1-514-383-5293

*DISTO and CRC Computers are registered trade marks. The DISTO Super Controller and add-ons are copywrited by DISTO.

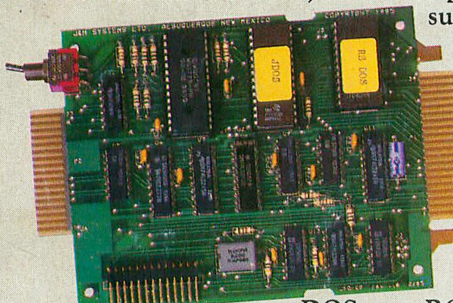
HEAT UP YOUR COCO!

New HARD DRIVES

Besides the obvious advantage of increased disk access speeds and a vast amount of storage, our COCO hard drives boast many innovative features. For instance, you may boot OS/9 directly from JDOS - no intermediate boot floppy is required. Our software can run with virtually any winchester with a ST412 type interface. Our drives have capacities of 5, 10, or 20 MBytes (formatted), and may be either partitioned into up to 7 logical units or left as one large logical unit. Our COCO hard drive systems are complete with case, power supply, cables, OS/9 drivers, and instructions. Prerequisite: OS/9, JFD-CP controller.

5¼" 5 MByte full size	$495
5¼" 10 MByte ½ size	$650
3½" 20 MByte (shown above)	$795

JFD-CP DISK CONTROLLER



Our new JFD-CP, compatible with both the original COCO and the COCO 2, features a parallel port to support a Centronics compatible printer or our hard drive, and an external ROM switch, which allows you to select JDOS or an optional RS DOS-type ROM. It comes in a case and includes JDOS 1.2 and manual. JDOS implements all RS DOS commands, plus many more, including auto line numbering, error trapping, baud rate selection, OS/9* boot from floppy or hard drive, and Memory Minder**, our disk drive analysis program (Precision Alignment Disk not included).

JFD-CP Disk Controller with JDOS	$139

COCO-CLASSIC

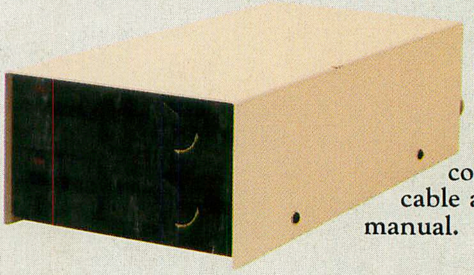
Our old JFD-COCO controller remains a strong seller. Some people just like old "classics" best! So we have brought it back at the lowest price ever!

JFD-COCO Disk Controller with JDOS	$99

New TERMS

One-year warranty on parts & labor; 30-day money back guarantee (except shipping) if not totally satisfied. Items must be returned in like new condition.
Free shipping via UPS in continental United States for payment by VISA, MasterCard, or cashiers check. COD requires 10% prepayment by bank card plus 3% shipping. Blue Label and foreign shipping extra.

DRIVE SYSTEMS



Upgrade your Color Computer by adding our new JFD-CP disk controller, supercharged with JDOS 1.2 operating system, and a top quality drive with case and power supply. Comes complete with cable and JDOS manual.

Drive 0 System with one single side drive	$279
Drive 0 System with one double side drive	$349
Drive 0,1 System with two single side drives	$389
Drive 0,1 System with two double side drives	$489

MEMORY MINDER**

Memory Minder is a disk drive test program now included in JDOS. Used with a Precision Alignment Disk, Memory Minder allows you to check your drives for speed, alignment, sensitivity, hysteresis, and more! You can actually align or adjust the drives while viewing the graphics on the screen. No special equipment needed!

PRECISION ALIGNMENT DISKS (From Dysan)	
PAD-40X1: Tests single side disk drives	$26
PAD-40X2: Tests double/single disk drives	$33

Memory Minder is available on diskette for those who don't own a JFD-CP controller with JDOS. Includes Precision Alignment disk.

Memory Minder: single side package	$59
Memory Minder: single/double side package	$75

---

*OS/9 is a registered trademark of Microware, Inc.
**Memory Minder is a registered trademard of J&M Systems, Ltd.

J&M SYSTEMS, LTD.

15100-A CENTRAL SE
ALBUQUERQUE, NEW MEXICO 87123
505/292-4182